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Electrocardiogram Quiz – Case 3

E. Petrou,
P. Mantzouratou,
D. Konstantinidis,
A. Mitropoulou,
G. Boutos,
D. Mantzouratos

Department of Cardiology, General Hospital of Patisia, Athens, Greece

A 79-year-old female presented to the emergency department of our hospital with a history consistent with atypical, non-exertional chest pain and fever up to 38.7 °C of four days. The patient's personal history included a well controlled arterial hypertension under aliskiren. The patient was hemodynamically stable with a blood pressure of 150/80 mmHg, oxygen saturation 97%, respiratory rate 16 breaths/min and normal body temperature. Heart auscultation revealed a friction rub. The initial ECG demonstrated sinus rhythm at a rate of 80 beats per minute, as well as narrow QRS complexes (60 msec) and T wave inversion in the V1–V5 precordial leads (fig. 1). Chest x-ray and a complete set of cardiac biomarkers were normal. A transthoracic echocardiogram demonstrated minor pericardial effusion, which enhanced the suspicion of pericarditis. The patient was admitted to the hospital for further investigation and treatment. However, an hour later and with no change in the patient's condition, a second ECG revealed a complete left bundle branch block (LBBB) QRS complex configuration and T wave normalization without any substantial alteration of the heart rate (fig. 2).

Questions

a. How can the differences between the two ECGs be explained?

b. What is the clinical significance of these findings?

Comment

Successive ECG documentation supported by 24-hour Holter rhythm monitoring demonstrated alternating patterns of LBBB and narrow QRS complex, suggestive of the intermittent LBBB (ILBBB) phenomenon (fig. 3).

In many cases, particularly in older adults, the newly documented LBBB raises concerns about underlying advanced and or advancing heart disease. LBBB appearance can be rate dependent –both tachycardia and bradycardia related– or rate independent. In both cases, the LBBB is defined as intermittent. ILBBB is usually rate dependent. The presence or absence of LBBB depends on slight differences in heart rate which are often below the threshold for tachycardia. The rate at which a patient's ECG converts from one pattern to the other –critical heart rate– is not constant over time. Moreover, the critical rate at which normal sinus rhythm converts to LBBB is often higher than the rate at which LBBB will disappear. Classically, patients with ILBBB will have abnormal appearing T waves, when their QRS conduction is of normal length, as in our case. This is likely due to repolarization "memory" of periods in which the

Figure 1. ECG on admission.

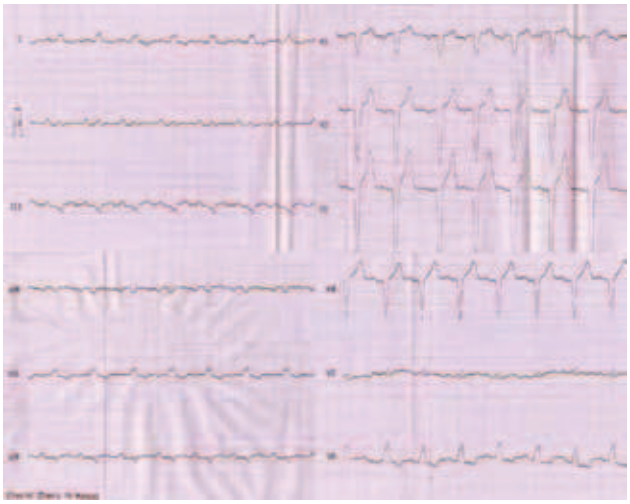

Figure 2. ECG one hour after admission.

Figure 3. 24 hours Holter rhythm monitoring.

conduction system demonstrated a block. When these abnormal T waves appear pronounced –the so-called Wellens' waves– they could represent a critical left anterior descending branch lesion.

The clinical significance of ILBBB is unclear. Several studies have reported finding normal coronary arteries in series of patients with ILBBB. However, one randomized control study of patients with exercise-induced ILBBB suggests that this may be a prognostic factor of coronary artery disease, postulating a higher risk of death and of major cardiac events within 5 years.

In conclusion, the presence of ILBBB combined with chest pain can be responsible for misleading diagnosis. A thorough evaluation of a patient presenting with ILBBB may save time and money by avoiding unnecessary monitoring and admissions.

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Corresponding author:

E.G. Petrou, Department of Cardiology, General Hospital of Patisia, 15–17 Chalkidos street, GR-111 43 Athens, Greece
e-mail: emmgpetrou@hotmail.com