Short Communications

Right Bundle-Branch Block Unmasking a Myocardial Infarction

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Summary: A patient with an acute antero-septal myocardial infarction and intermittent right bundle-branch block is presented. Abnormal Q waves in right precordial leads were only observed during right bundle-branch block. In the absence of right bundle-branch block, depolarization of the right ventricular free wall concealed the abnormal Q waves typical of an antero-septal infarct. Right bundle-branch block, by preventing early activation of the right ventricular free wall, facilitated the correct diagnosis and localization of the infarction.

Key words: right bundle-branch block, myocardial infarction

Introduction

It is well known that left bundle-branch block, by altering the initial portion of ventricular activation, may prevent the appearance of the abnormal Q waves diagnostic of a myocardial infarction (MI).¹ On the other hand, right bundle-branch block delays the terminal portion of the QRS and therefore does not interfere with the diagnosis of MI.

It is not well appreciated that right bundle-branch block can, in rare cases, facilitate the appearance of abnormal Q

waves associated with an antero-septal MI.^{2,3} In the present case, this phenomenon is demonstrated and the mechanisms are discussed.

Case Report

An 83-year-old woman with a history of hypertension presented to the emergency department with a complaint of chest pain of 2-h duration. Physical examination on admission revealed a thin, elderly female with a blood pressure of 150/90, heart rate of 74 beats/min, respiratory rate of 18/min, and temperature of 37°C. Jugular venous pulsations were about 5 cm above the right atrium with normal A waves. Breath sounds were normal bilaterally. Cardiac examination revealed normal first and second heart sounds, a fourth heart sound at the apex, and no murmurs. The abdomen was soft, nontender, without hepato- or splenomegaly. The extremities had normal peripheral pulses with no edema or cyanosis. Neurological examination was normal. The initial electrocardiogram (ECG) (Fig. 1A) showed sinus rhythm, left anterior hemiblock, and 1–2 mm ST-segment elevation in leads V₁–V₄. There were tall R waves in leads V₁ and V₂ and deep S waves in leads V₅ and V₆. Thirty min after the first ECG, transient right bundle-branch block developed, associated with the appearance of abnormal Q waves in leads V₁ to V₄ diagnostic of an antero-septal MI (Fig. 1B). The third ECG obtained 35 min later, when the right bundle-branch block disappeared, showed again absence of Q waves in precordial leads (Fig. 2). A bedside two-dimensional echocardiogram demonstrated akinesis of the distal two thirds of the interventricular septum as well as of the anterior wall of the left ventricle. The patient underwent angioplasty of a mid left anterior descending coronary artery lesion. She remained asymptomatic for the next 4 days and had no complications. In all, 11 ECGs were obtained. Left anterior hemiblock was seen in all tracings. Right bundle-branch block was present in 5 of 11 ECGs. Abnormal Q waves in right precordial leads were only seen during right bundle-branch block or during ventricular premature beats with right bundle-branch block morphology (Fig. 3).

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FIG. 1 Initial electrocardiogram obtained upon arrival at the emergency department (A) shows sinus rhythm, left anterior hemiblock, and 1–2 mm ST-segment elevation in leads V₁–V₄. Abnormal Q waves are only present during transient right bundle-branch block (B).

FIG. 2 Another electrocardiogram obtained when right bundle-branch block disappeared. Q waves are not visualized in the right precordial leads.

Discussion

The initial portion of the QRS is affected by left but not by right bundle-branch block. Therefore, it is accepted that the ECG diagnosis of MI is not altered by right bundle-branch block.

FIG. 3 An atrial premature beat conducted with functional right bundle-branch block unmasks the abnormal Q wave in V₁ characteristic of a septal infarction.

There are few reports showing right bundle-branch block unmasking a septal infarction.^{2,3} Rosenbaum *et al.*⁴ proposed that depolarization of the right ventricular free wall could mask the abnormal Q waves in some patients with an antero-septal MI. The right ventricle is positioned anterior to the left ventricle, and activation of the right ventricular free wall can neutralize the abnormal septal forces associated with an antero-septal MI. Therefore, in some patients with a septal infarction, abnormal Q waves in right precordial leads may not be apparent unless right bundle-branch block develops. During right bundle-branch block, or during atrial premature beats conducted with functional right bundle-branch block, delayed activation of the right ventricle allows the occurrence of abnormal Q waves.

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