

Dynamic variations of P-wave duration in a patient with acute decompensated congestive heart failure

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Abstract

Interatrial block is an abnormally delayed atrial activation, characterized at ECG by prolonged P-wave duration (more than 110 ms), irrespective of morphology. We report the case of a patient with acute decompensated severe congestive heart failure, that at hospital admission showed a prolonged P-wave, which reverted after diuretic therapy. The dynamic change of the atrial P-wave correlates with clinical evolution and serum level modification of B-type natriuretic peptide. (Cardiol J 2011; 18, X: xx–xx)

Key words: interatrial block, congestive heart failure, NT-proBNP

Introduction

A careful electrocardiogram (ECG) analysis is useful in order to obtain essential information for the management and prognostic evaluation of patients with acute congestive heart failure (CHF) [1], although not usually performed in the setting of clinical practice.

We report the case of a patient admitted to the Intensive Coronary Care Unit (ICCU) of our hospital, for acute decompensated severe CHF, who during the stay showed dynamic change of the atrial P-wave at the ECG, which correlated with clinical evolution and serum level modification of B-type natriuretic peptide (NT-proBNP).

Clinical case

A 45 year-old white male, dyslipidemic and obese, affected by idiopathic dilated cardiomyopathy and implanted with an automatic cardiac defibrillator was admitted to our ICCU for acute decom-

pensated heart failure. He was tachycardic, dyspneic and hypotensive. Clinical examination found bilateral pulmonary rales (Killip class 3), peripheral edema, and jugular vein distension. Arterial blood gas analysis showed respiratory acidosis with rising lactates level. Renal function was impaired (creatinine 2.3 mg/dL) and proBNP was 2,346 ng/L. Chest radiography showed pulmonary congestion. An echocardiogram revealed left ventricular end-diastolic volume 152 mL/m², left ventricular ejection fraction (LVEF) 0.28, moderate functional mitral valve regurgitation, left atrial dilation (area 28 mm²), tricuspid annular plane systolic excursion (TAPSE) 18 mm, and Doppler pulmonary artery systolic pressure (PASP) 65 mm Hg.

At admission, the ECG showed sinus rhythm, interatrial block (IAB) (P-wave duration 155 ms), first degree atrioventricular block, and incomplete left bundle branch block (Fig. 1).

Respiratory support with continuous positive airway pressure was applied and respiratory acidosis was corrected. Dopamine drip 5 µ/kg and furo-

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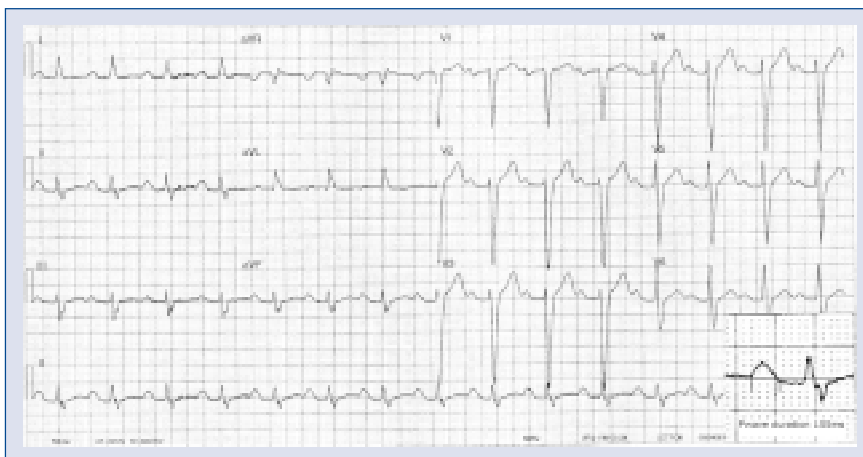


Figure 1. ECG at admission sinus rhythm, interatrial block (P-wave duration of 155 ms), first degree atrioventricular block, incomplete left bundle branch block.



Figure 2. ECG displayed sinus rhythm, a reduction of P-wave duration to 105 ms, first degree atrioventricular block, incomplete left bundle branch block.

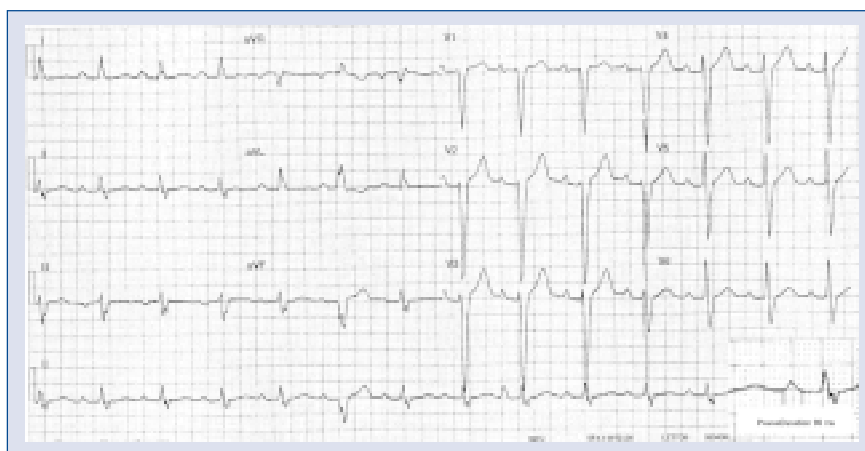


Figure 3. ECG displayed sinus rhythm, resolution of interatrial block with a P-wave duration of 90 ms, first degree atrioventricular block, incomplete left bundle branch block.

semide 450 mg/24 h drip was started. During the following hours, a copious diuretic response was obtained and the clinical and laboratory parameters improved. On the second day, the blood pressure normalized, dopamine was stopped and furosemide switched to a 20 mg bolus three times per day. A repeated ECG displayed a reduction of P-wave duration to 105 ms (Fig. 2). The next day, his clinical condition had considerably improved, intravenous therapy was stopped, furosemide per os was introduced and the patient was transferred to a ward. An ECG revealed resolution of IAB with a P-wave duration of 90 ms (Fig. 3). The proBNP was reduced to 555 ng/L.

An echocardiogram was repeated, which showed a LVEF slightly improved (0.30), left atrial area 26 mm², PASP 45 mm Hg, and TAPSE 20 mm.

Discussion

IAB, as described by Spodick et al. [2], is an abnormally delayed activation passing from the right to the left atrium, easily identified at ECG by prolonged P-wave duration (more than 110 ms).

When pressure in the right atrium is increased (e.g. valvular disorders, CHF, and hypervolemia) atrial strain occurs, even on the superior portion of the atrial septum and the atrial roof where Bachmann bundle (BB), involved in interatrial conduction, run [3]. Atrial fiber stretch could alter the function of BB, and induce prolonged conduction or unmask an already slowed impulse transmission leading to a wide P-wave (> 110 ms) [3], known as partial IAB irrespective of morphology in lead V1.

Instead, the appearance of a wide (> 110 ms) biphasic P-wave in inferior leads points to an advanced IAB characterized by block of conduction in the BB and activation of left atrium in reverse through the coronary sinus [4].

Ariyarajah et al. [5] showed that advanced interatrial block may not be a complete block as previously thought, and that perhaps even the primary abnormality, partial interatrial block, can be reversed or at least ameliorated. Furthermore, in heart failure cases, P-wave duration can be decreased by diuretic therapy (as can left atrium size) [6].

IAB correlates with atrial enlargement and dysfunction [7] and is a predictor of significant atri-

al arrhythmias, particularly atrial fibrillation, as well as embolic stroke [8].

Few studies have described the modification of P-wave during an episode of decompensated heart failure [9–11]. IAB can occur in CHF and confer an important prognostic value but, astonishingly, remains poorly investigated [7, 8].

Our case report confirms previous observations and underscores the usefulness of careful ECG evaluation. Furthermore, we describe a correlation between P-wave duration and NT-proBNP level. In our case gradual reversion of partial IAB correlates with clinical condition and surrogates for therapy response.

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