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Case Report

Cardiocentro Ernesto Che Guevara Santa Clara Cuba

Case Report: Rare Variant of Masquerading Right Bundle Branch Block

Variante rara de bloqueo enmascarado de rama derecha. Presentación de un paciente

Yosleivy Estevez Rubido, MD[1]; Julio Flavio Ocsa Borda, MD[2]; Luis Arturo Zapata Figallo, MD[3]; Mariano Manuel Yañez Cesti, MD[4]

[1]Department of Cardiology. Hospital de la Solidaridad. Sullana Province. Piura Department. Peru
[2]Department of Cardiology. Policlínico Meddix. Callao Province. Peru.
[3]Department of Cardiology. Hospital de Apoyo Minsa II-2 of Sullana. Sullana Province. Piura Department. Peru.
[4]Department of Cardiology of Clínica Santa Rosa. Sullana Province. Piura Department. Peru.

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Abstract

Masquerading bundle branch block, also referred to as disguised bundle branch block, is an electrocardiographic pattern characterized by right bundle branch block in the horizontal plane leads associated with a left bundle branch block morphology in the frontal plane leads. It occurs predominantly in elderly patients and in those with structural heart disease. The main clinical presentations are syncope and heart failure. We present a 73-year-old patient with three syncopal episodes and no symptoms of heart failure. The electrocardiogram revealed a mixed or global variant of masquerading right bundle branch block with a normal echocardiogram. The possibility of an electrophysiological study and cardiac resynchronization therapy was considered.

Keywords: Masquerading right bundle branch block, electrocardiogram, cardiac conduction disorders

Resumen

El bloqueo de rama enmascarado, también llamado disfrazado, es un patrón electrocardiográfico caracterizado por un bloqueo de rama derecha en derivaciones del plano horizontal asociado a una morfología de bloqueo de rama izquierda en derivaciones del plano frontal. Se manifiesta fundamentalmente en pacientes de edad avanzada y con algunas cardiopatías estructurales. Las principales formas clínicas de presentación son el síncope y la insuficiencia cardíaca. Se presenta un paciente de 73 años de edad con cuadros sincopales en 3 ocasiones, sin síntomas de insuficiencia cardíaca; se observa en el electrocardiograma una variante mixta o global de bloqueo enmascarado de rama derecha con ecocardiograma normal. Se valora la posibilidad de estudio electrofisiológico y terapia de resincronización cardíaca.

Palabras clave: *Bloqueo enmascarado de rama derecha, electrocardiograma, trastornos de la conducción cardíaca*

Introduction

From the early twentieth century to the present, numerous studies have been conducted to improve understanding of the heart's electrical function, including the phenomena of cardiac depolarization and repolarization. Many discoveries in this field have contributed to the management of related abnormalities.[1]

In 1954, Richman and Wolff[2] first described the phenomenon of disguised left bundle branch block, referring to patients whose electrocardiograms showed a left bundle branch block pattern in the limb leads, right bundle branch block morphology in the right precordial leads, and absence or very small S-wave amplitude in lead I. In 1968, Rosenbaum et al.[3] proposed instead that this pattern

Corresponding author:
Yosleivy Estevez Rubido, MD
yosleivyer@gmail.com

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represented a right bundle branch block associated with a high-grade anterior fascicular hemiblock.

Subsequent investigations identified masquerading right bundle branch block in patients with specific types of cardiomyopathy, although reported prevalence rates varied.[1,4]

Its true prevalence is currently unknown. However, this electrocardiographic pattern appears more frequently in elderly patients or in those with structural heart disease such as coronary artery disease, ventricular hypertrophy, dilated cardiomyopathy, Chagas myocarditis, or idiopathic degeneration of the cardiac conduction system.[1,4,5]

Masquerading or "disguised" bundle branch block should be interpreted as an advanced stage of heart disease. Its presence on the electrocardiogram denotes a poor prognostic factor as it reflects significant intraventricular conduction delay or damage.[5]

Case Report

A 73-year-old white male with a 10-year history of essential hypertension, treated with various regimens, is currently receiving losartan potassium 50 mg every 12 hours and amlodipine 5 mg daily for blood pressure control.

The patient reported that in 2016 he experienced a sudden loss of consciousness following a stressful work situation, which he did not consider significant. In 2017, he had another similar episode; upon hospital evaluation, the syncope was attributed to emotional stress. On June 11, 2023, he experienced a new syncopal event and was again taken to the hospital. According to the patient, heart rates below 30 beats per minute were documented, and intravenous atropine infusion was administered, with recovery of heart rate 30 minutes later. No electrocardiographic documentation of these events was preserved.

During cardiology follow-up, he was classified as functional class I according to the New York Heart Association (NYHA), completely asymptomatic from a cardiovascular standpoint, with normal vital signs. The electrocardiogram (**Figure 1**) showed a left bundle branch block pattern in the frontal plane, also a complete right bundle branch block in the horizontal plane (right precordial leads), and again a left bundle branch block pattern in the left precordial leads. A prolonged PR interval of 0.22 seconds was also noted.

Transthoracic echocardiography (**Figures 2 and 3**) revealed non-dilated cardiac chambers and mild concentric left ventricular hypertrophy without outflow tract obstruction, with diastolic dysfunction secondary to hypertension (**Figure 2**). Systolic function was preserved in both ventricles; left ventricular systolic performance is shown in **figure 3**. The patient was referred for a specialized electrophysiological evaluation with the aim of undergoing cardiac resynchronization therapy, given its potential benefits. Coronary computed tomography angiography was also proposed to rule out significant coronary lesions.

Comment

Masquerading bundle branch block, also called disguised bundle branch block, is an uncommon but clinically significant finding on the 12-lead electrocardiogram. Syncope and heart failure are the usual clinical manifestations, particularly in individuals aged 60 years or older.[6]

Masquerading right bundle branch block is primarily associated with ischemic heart disease, heart failure, hypertensive heart disease, varying degrees of atrioventricular block, Chagas myocarditis, Lev-Lenegre disease, atrial fibrillation, and aortic stenosis.[7,8,9]

Four electrocardiographic variants of masquerading bundle branch block have been described. The standard variant is the most frequent, followed by the precordial type. The third form is associated with right axis devia-

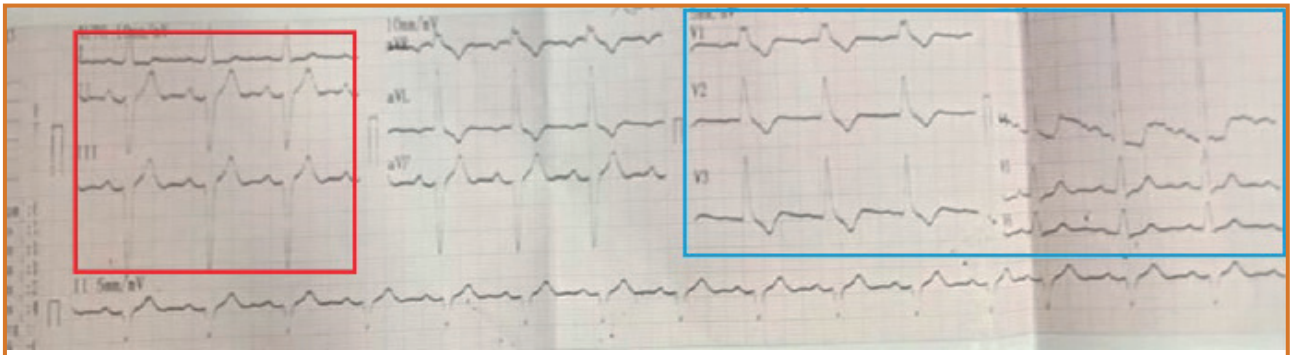

Figure 1. Electrocardiogram of the patient with the 12 leads. Red box: Leftward electrical axis of the QRS complex. Blue box: Right bundle branch block pattern in the precordial leads.

tion in the frontal plane, and the fourth has been described in patients with atrioventricular block by Carmona Puerta et al.[10] The present case is characterized by a mixed masquerading bundle branch block, with syncope as the clinical manifestation and no complex structural heart disease on echocardiography.

The standard variant is recognized by a right bundle branch block pattern in the horizontal plane (precordial leads) but a left bundle branch block–like pattern in the frontal plane. The electrocardiogram shows tall and broad R waves in V1, leftward QRS complex electrical axis deviation, and an S wave less than 1 mm or absent in lead I and aVL. Occasionally, a small r wave may be observed in lead I due to initial forces of left anterior fascicular block directed inferiorly and rightward. A prolonged PR interval may be present in a significant number of cases but is not mandatory for diagnosis.[8,9,10]

The precordial variant is less frequent than the standard form. The QRS complex duration is ≥120 milliseconds, with a leftward deviation of the electrical axis in the frontal leads, residual S waves in lead I and residual R waves in lead II; prominent anterior forces due to right bundle branch block, and a QRS complex configuration of type R or qR. The horizontal plane leads (left precordial leads) from V4 to V6 are predominantly positive with notching, closely resembling left bundle branch block, with a residual or absent S wave in V69.[10]

The variant of masquerading bundle branch block with right axis deviation has been scarcely reported and is characterized by a QRS complex duration ≥120 milliseconds on the electrocardiogram, and a frontal plane QRS electrical axis of +90°. The presence of an S wave in leads I and aVL (frontal plane leads) suggests right bundle branch block; however, a monophasic QRS configuration in leads II and III is observed, as seen in left bundle branch block with right axis deviation. Prominent anterior forces due to right bundle branch block are observed, with an R-type QRS configuration in lead V1.[10]

The fourth mixed or global variant described by Carmona Puerta et al.[10] exhibits features of the standard type in the frontal plane and those of the precordial type in the horizontal plane, consistent with the electrocardiographic findings in this case.

Cardiac resynchronization therapy has proven its value in patients with heart failure and advanced left bundle branch block. However, a substantial number of patients with right bundle branch block have also been treated using this method.

Current evidence suggests several scenarios in which patients with wide QRS complexes and a right bundle branch block pattern may respond favorably to cardiac resynchronization therapy. These can be summarized into five groups:

1. QRS cpmplex duration greater than 150 milliseconds.
2. Wide QRS complex without left bundle branch block pattern associated with a PR interval greater than 230 milliseconds.
3. Masquerading right bundle branch block.
4. Right bundle branch block associated with extreme leftward axis deviation of the QRS complex.
5. Demonstration of significant mechanical

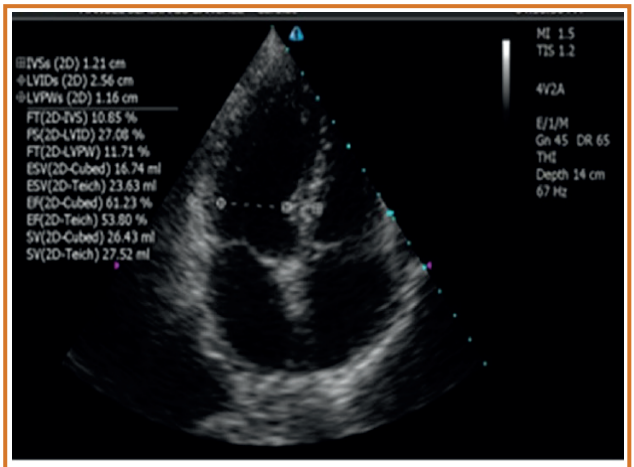

Figure 2. Echocardiographic imaging of the patient. Measurements are taken in a 4-chamber apical view of the left ventricle. Note that there is no dilation, and the hypertrophy is mild.

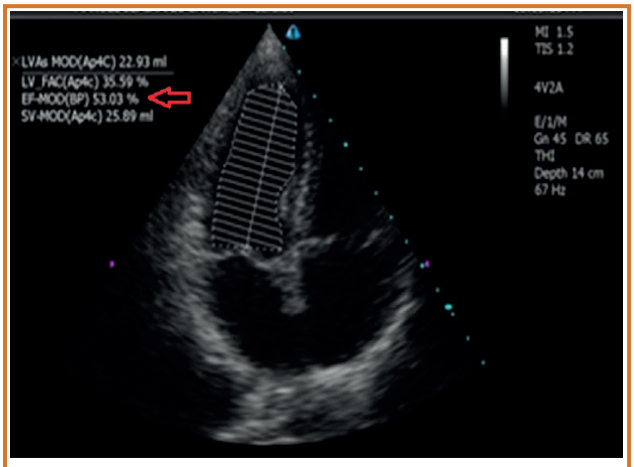

Figure 3. Echocardiographic imaging of the patient with calculation of the left ventricular ejection fraction using the modified Simpson method.

dyssynchrony even in the absence of a left bundle branch block pattern.[11]

Based on the above considerations, it is estimated that the patient presented may derive greater benefit from cardiac resynchronization therapy than from implantation of a conventional right ventricular pacing pacemaker alone.

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