TURKISH JOURNAL OF EMERGENCY MEDICINE

Case Report/Case Series

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DOI: 10.4103/tjem.tjem_64_24

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Masquerading details behind a murmur and chest pain

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Abstract:

Masquerading bundle branch block (MBBB) is a rare presentation of bifascicular blocks. It is the result of a right bundle branch block associated with an advanced left anterior fascicular block due to extensive damage to the conduction system. We present the case of a 75-year-old male with late onset presentation anterior wall myocardial infarction (MI) with ongoing ischemia (which evolved into a ventricular septal defect [VSD]). Electrocardiographically, the MBBB is characterized by a prominent R in V1, left axis deviation and absence of small S waves in I and aVL. Its presence confers a poor prognosis and high risk of progressing to advanced atrioventricular block (AAVB). A mortality rate between 18% and 38.9% has been found and 41.4%–59% of the patients develop AAVB requiring pacemaker implantation. To our knowledge, this is the first reported MBBB case in the setting of an MI complicated with VSD, demonstrating its association with the presence of critical anteroseptal ischemia. The patient rejected any kind of intervention, palliative care was offered, and he died 2 months later.

Keywords:

Bundle-branch block, chest pain, heart murmurs, masquerading block, myocardial infarction

Submitted: 31-03-2024
Revised: 12-07-2024
Accepted: 12-07-2024
Published: 02-01-2025

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Introduction

A ventricular septal defect (VSD) after an acute coronary syndrome has become rare in the era of reperfusion therapy, occurring in approximately 0.2% of myocardial infarctions (MIs)[1] The VSDs that are typically observed within the first 24 h or between 3 and 7 days after a MI are associated with significantly high rates of morbidity and mortality. The estimated survival rate stands at 8% after 30 days and <3% after 1 year.[2] Risk factors associated with the occurrence of post-MI VSDs encompass advanced age, female sex, and the occlusion of the left anterior descending (LAD) coronary artery.[3] Masquerading bundle branch block (MBBB) represents an advanced form of bifascicular blocks associated with extensive damage to the conduction system which confers poor prognosis and high risk of progressing to advanced atrioventricular block (AAVB).[4] We present the case of an old male patient with late onset presentation anterior wall MI with ongoing ischemia which evolved into a VSD.

Case Report

A 75-year-old patient, active smoker, admitted to the emergency department due to chest pain that started 48 h ago. The initial evaluation revealed a heart rate of 100 bpm, blood pressure of 130/80 mmHg, and oxygen saturation of 96%. Physical examination was unremarkable. A 12-lead electrocardiogram (ECG) was

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How to cite this article: Orozco AN, Navajas AN, Roldan AR, Ocampo CL, Sanchez JM. Masquerading details behind a murmur and chest pain. Turk J Emerg Med 2025;25:59-62.

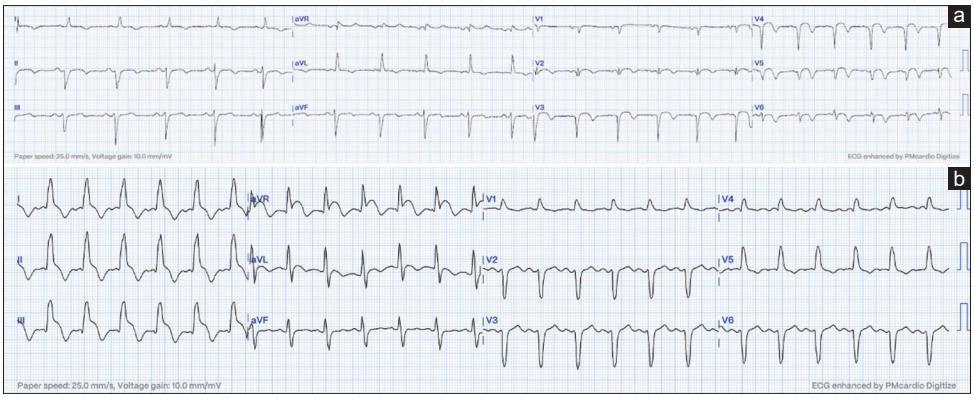

Figure 1: (a) Initial electrocardiogram (ECG): Sinus rhythm, heart rate 75 bpm, R wave amputation in precordial leads, left anterior fascicular block, T-wave inversion in V2–V6, I and aVL, ST segment elevation in V3–V5, suggestive of late presentation anterior wall myocardial infarction, (b) Second ECG: Sinus rhythm, heart rate 107 bpm, widening (160 ms), with right bundle branch block morphology in precordial leads and left bundle branch block in extremity leads, and ST elevation in V3–V4

obtained [Figure 1a], as well as high-sensitive troponin I, with a value of 51,345 ng/L (reference range: 0–40 ng/L). Hours later, the pain recurred and a holosystolic murmur in the left sternal border was detected. A new ECG was obtained [Figure 1b].

The initial ECG showed sinus rhythm, a heart rate of 75 bpm, the Morris index was present in lead V1, loss of r wave progression in precordial leads, left anterior fascicular block (LAFB), T-wave inversion in leads V2–V6, I and aVL, ST segment elevation in leads V3–V5, and Q waves in the precordial leads. In the second ECG, showed sinus rhythm, and remarkably, the QRS complex was prolonged (160 ms), with right bundle branch block (RBBB) morphology in precordial leads and left bundle branch block (LBBB) morphology in frontal leads. In addition, he had an ST elevation in leads V3–V4. These findings were suggestive of an established infarction of the anterior wall of the left ventricle (LV) that evolved into a MBBB with ongoing ischemia.

Based on the clinical course, the ECG findings and the murmur, a transthoracic echocardiogram was performed, showing a left ventricular ejection fraction of 22%, dyskinesia of all apical and mid-segments and an apical 8 mm VSD [Figure 2]. Coronary arteriography [Figure 3] showed an occlusion of LAD coronary artery and severe disease of the right coronary artery (RCA). The patient rejected any kind of intervention, palliative care was offered, and he died 2 months later.

The written approval was obtained from the patient.

Discussion

In 1954, Richman and Wolff described the findings of four vectocardiograms, which showed an RBBB pattern in precordial leads and LBBB in the frontal leads. The authors used the term "masquerading" given that despite presenting a RBBB, the resulting complex was

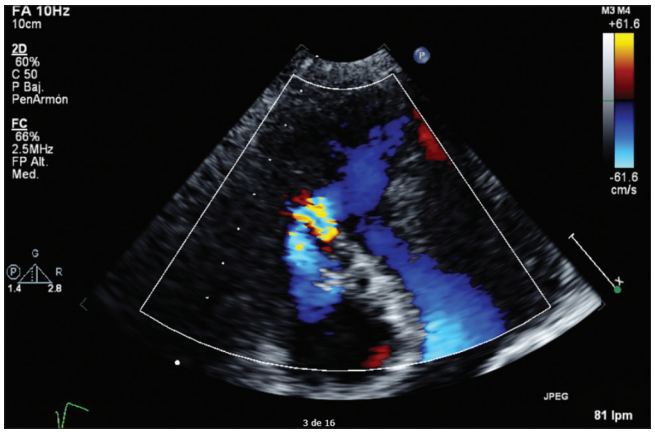

Figure 2: Transthoracic echocardiogram showing an 8-mm apical ventricular septal defect

a result of a modified LBBB due to septal or extensive posterolateral ischemia, or for having a more vertical heart.[5] In subsequent anatomopathological studies, patients with MBBB disease were proven to have a severe disease of the conduction system, with extensive fibrosis and hypertrophy.[6] In MBBB, an RBBB is associated with an advanced LAFB, so the resultant vector is directed upward, forward, and rightward due to a balance between the final forces originated by the delay in the conduction of the impulse in the left ventricular free wall and the right side. Conversely, in typical bifascicular blocks: LAFB and RBBB, the initial forces are directed upward and leftward while the terminal forces points upward, forward, and rightward, respectively.[7] For this reason, V1 shows a dominant R, whilst I shows a wide R or qR without an S, with rS or QS in II, III and AVF.[8] The absolute prevalence of MBBB is unknown, but it is considered a rare presentation of bifascicular blocks. Bayés de Luna *et al*. found 16 cases after reviewing 100.000 ECGs, and Schroder e Souza, *et al*. found 25 cases amongst 600.000 ECGs.[9,10]

Electrocardiographically, the MBBB is characterized by: (a) A prominent R in V1, (b) Left axis deviation,

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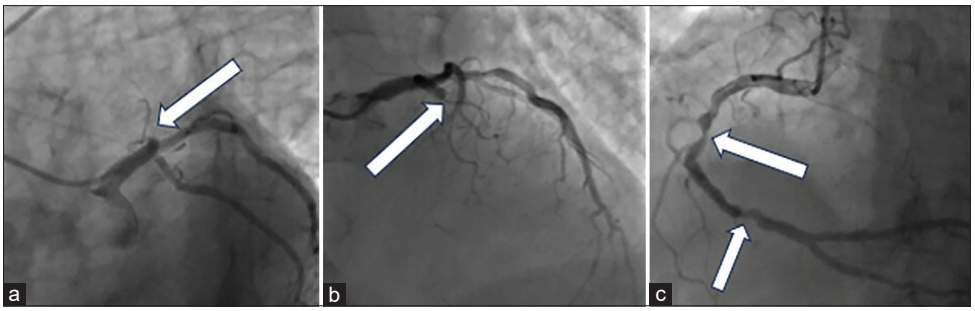

Figure 3: Coronary arteriography: (a and b) Proximal left anterior descending coronary artery occlusion (white arrow) and (c) Severe lesion of the mid (upper white arrow) and distal thirds (lower white arrow) of the right coronary artery

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and (c) absence of small S waves in I and AVL. In 1973, Rosenbaum described a second type of MBBB, with the absence of an S wave in V5–V6, but not in tall V1 (second intercostal space), mainly when the LAFB was associated with a parietal block of the LV.[8]

The MBBB is associated with different cardiac conditions, mostly ischemic cardiomyopathy, but also other cardiomyopathies such as hypertensive cardiomyopathy, Chagas disease, valvular, and degenerative conduction system diseases, such as Lev and Lenegre diseases.[11] Its presence confers a poor prognosis and indicates the presence of an advanced cardiac disease.[7] Schroder e Souza *et al*. found that in 25 patients with MBBB, 38.9% died by 2 years and 41.4% required pacemaker implantation.[9] Similar data were reported by Gómez Barrado *et al*., who followed 22 patients with MBBB for 3 years, after which 59% developed an AAVB, and 18% died.[12]

The present case describes the appearance of an MBBB in a patient with a MI with significant compromise of the LAD and RCA. The finding of a murmur in a patient with MI suggests mechanical complications, such as VSD, which has implications in the prognosis and patient management. As such, the importance of requesting a new ECG is emphasized when a patient experiences a recurrence of chest pain. To our knowledge, this is the first reported MBBB case in the setting of an MI complicated with VSD, demonstrating its association with the presence of critical anteroseptal ischemia. The patient required a surgical intervention and quite possibly a pacemaker implantation in the follow up; however, the patient rejected any type of intervention, which translated into early mortality.

Conclusions

The MBBB is a rare presentation of fascicular blocks, associated with advanced cardiac disease. It indicates a worse prognosis; most patients progress to an AAVB, and require a dual chamber pacemaker implantation. The finding of a new murmur in a patient with MI suggests mechanical complications, such as VSD; despite it being uncommon VSD is linked to significantly high rates of morbidity and mortality.

Author contribution statement

- ANO: Conceptualization (lead); data curation (lead); investigation (lead); supervision (lead); visualization (lead); writing – original draft (lead); writing – review and editing (equal)
- ANN: Writing – review and editing (equal)
- JMSS: Writing – review and editing (equal)
- ARR: Writing – review and editing (equal)
- CLO: Writing – review and editing (equal).

Conflicts of interest

None Declared.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Funding

None.

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