

Bifascicular Heart Block with S1S2S3 Pattern in Minor Chest Disorders and Coronary Spasm; Reversal and Interpretation- A case Report

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Abstract

Rationale: Simultaneous cardiovascular and chest disorders may be present and common. Bifascicular block (BFB) is mostly involving the conduction delay or block just below the atrioventricular node. It affects two of the three fascicles. A strong link between death and bifascicular block was reported. The S1S2S3 pattern is an inconstant prognostic ECG sign. The pattern indicates that the S-waves voltage is more than 1.5 mm in I, II, and III. Coronary spasm has a pivotal role in the mechanism of coronary artery disease.

Patient concerns: A 66-year-old widow housewife Egyptian female diabetic hypertensive patient presented to the physician outpatient clinic with a right bundle branch block (RBBB) with a left anterior fascicular block (LAFB), and ischemic heart disease.

Diagnosis: Bifascicular heart block with electrocardiographic S1S2S3 pattern in pulmonary nodule and pneumatocele with coronary artery spasm.

Interventions: ECG, oxygenation, chest CT, and echocardiography.

Outcomes: Dramatic electrocardiographic response and good outcomes despite there are numerous noteworthy risk factors had happened.

Lessons: Bifascicular heart block especially the left anterior fascicular block may be temporary and drug-responsive. The presence of the elderly female sex, diabetes, hypertension, atelectatic bands, pneumatocele, pulmonary nodule, coronary artery spasm, S1S2S3, and bifascicular heart block are constellation prognostic factors for the severity of the disease. At-home management should be not discouraged at all even in a risky case.

Keywords: Bifascicular block; coronary artery disease; heart block; pulmonary nodule; pneumatocele S1S2S3 pattern.

Abbreviations

CAS: Coronary artery spasm

CHD: Congenital heart disease

ECG: Electrocardiogram

ICU: Intensive care unit

IHD Ischemic heart disease

LAFB: Left anterior fascicular block

LPFB: Left posterior fascicular block

O2: Oxygen

POC; Physician outpatient clinic
 RBBB: Right bundle branch block
 SCD: Sudden cardiac death
 SHD: Structural heart disease
 VR: Ventricular rate

Introduction

Bifascicular block is a cardiac conductive delay or block below the atrioventricular node. It affects two of the three fascicles of the Purkinje of His [1]. The ventricular conduction is still working via the single remaining fascicle². The right bundle branch block (RBBB) with either left (LAD) or right axis deviation (RAD) is detected in ECG. RBBB with a left anterior fascicular block (LAFB) is more frequent than the left posterior fascicular block (LPFB). A single coronary artery blood supply (LAD) supplies the anterior fascicle and is implicated in pathogenesis. This association may be indicated by remarkable underlying cardiac pathology [2]. However, structural heart disease (SHD) exists in about 50-80% of cases. Extensive fibrosis of the conducting system is sometimes hallmarked. So, conversion to complete heart block occurs if damage to the remaining third fascicle (1-4% per year). The patients may be asymptomatic. There are documented frequent SHD in a bifascicular block such as ischemic heart disease (IHD; 40-60%), aortic stenosis, anterior myocardial infarction (5-7%), Lenègre-Lev disease, congenital heart disease (CHD), and hyperkalemia [2]. A new bifascicular block with chest pain is more common in proximal LAD occlusion [2]. The relationship between sudden cardiac death and chronic bifascicular block was reported [3]. The link between SCD with IHD and ventricular fibrillation is highly interesting[3] . SISISIII pattern indicates that the S-waves voltage is more than 1.5 mm in I, II, and III. Acute pulmonary embolism is sometimes present [4]. SIRIIRIII pattern in a QRS-complex of smaller than 0.12 seconds may be associated with RVH or RBBB [5]. CHDs with either RVH

or RV hypertension are commonly seen in nearly 90% of SIS2S3 pattern [6]. Coronary artery spasm (CAS) is a very important and common cardiovascular disorder. It is a sudden, severe narrowing of an epicardial coronary artery that causes vessel occlusion or near-occlusion [7]. CAS has a critical role in causing IHD [8]. So, malignant arrhythmias, acute MI, and SCD are essential serious sequels of obstructive CAS [8]. Emotion, rage, and fright are the leading principal for the attacks [9].

Case presentation

A 66-year-old widow housewife Egyptian female patient presented to the physician outpatient clinic (POC) with tachypnea, palpitations, and dizziness. She gives a history of chronic hypertension on bisoprolol (5mg; OD) and diabetes mellitus on long-acting insulin (45 units, in 2 divided doses). There was a history of cholecystectomy 5 years ago due to recurrent calculous cholecystitis. The patient denied a history of other relevant diseases. Upon clinical examination; the patient had rapid breathing with a regular HR of; 68 bpm, BP of 140/80 mmHg, RR of 20 bpm, a temperature of 36.5°C, and pulse oximeter O₂ saturation of 96%. Mild bilateral pitting lower limb edema was present. The patient was advised to refer to the intensive care unit (ICU) but she rejects it. The patient was managed at home with the RBBB, LAFB, and IHD. Initially, the patient was treated with O₂ inhalation (by nasal cannula, 3L/min, as needed). Oral aspirin tablets (75 mg, OD), oral diltiazem (75 mg, OD), oral nitroglycerin retard (2.5 mg, BID), and oral torsemide (10 mg, fasting, OD) were added. The patient was daily monitored for temperature, HR, BP, and O₂ saturation. Serial ECG tracings through the management course were done. The initial ECG tracing done on the POC presentation showed NSR of VR; 68 with bifascicular heart block, SIS2S3 pattern, and ST-segment depression in V4-6 lead (Figure 1A).



The second ECG tracing was done within 3 weeks after the above treatment and showed NSR of VR; 63 with RBBB and reversal of the above ST-segment depressions (Figure 1B).



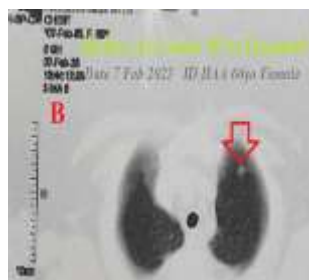
Figure-1: Serial ECG tracings; A. tracing was done on the POC presentation showed NSR of VR; 68 with, RBBB (lime arrows) bifascicular heart block, S1S2S3 pattern (golden arrows), pathological LAD (green arrows), and ST-segment depression in V4-6 (red arrows). B. tracing was done within 3 weeks after the above treatment and showed NSR of VR; 63 with RBBB (lime arrows), physiological LAD (green arrows), and reversal of the above ST-segment depressions.

A laboratory workup was done. The initial complete blood count (CBC); Hb was 13.7 g/dl, RBCs; $4.36 \times 10^3/\text{mm}^3$, WBCs; $6.9 \times 10^3/\text{mm}^3$ (Neutrophils; 65.0%, Lymphocytes: 34%, Monocytes; 0%, Eosinophils; 1.0% and Basophils 0%), Platelets; $244 \times 10^3/\text{mm}^3$. The other lab; d-dimer (250 ng/ml), CRP (6.3 g/dl), SGPT (14 U/L), SGOT (26 U/L), serum

creatinine (0.74 mg/dl), blood urea (20 mg/dl), HbA1C (6.77%), RBS (128mg/dl), plasma sodium (143mmol/L), serum potassium (4.1mmol/L), ionized calcium (0.92 mmol/L), and the troponin I test was negative. The initial CXR plain film showed left basal atelectatic bands and a prominent aortic knuckle (Figure 2A).



The initial chest CT showed and small fibrotic pulmonary nodule at the upper left lobe (Figure 2B) and a small pneumatocele at the right upper lung lobe (Figure 2C).



Echocardiography showed trivial tricuspid regurgitation with EF; 67 % (Figure 2D).



Abdominal ultrasound showed a shadow of the removed gall bladder with a cortical cyst at the left kidney (Figure 2E).



Figure -2: (A). CXR plain film showed left basal atelectatic bands (lime arrows) and a prominent aortic knuckle. (B). Chest CT without contrast without contrast showed and small fibrotic pulmonary nodule at the upper left lobe (red arrows) and (C) a small pneumatocele at the right upper lung lobe (orange arrows). (D). Echocardiography showed trivial tricuspid regurgitation with EF; 67 % (lime arrow). (D). Abdominal ultrasound showed a shadow of the removed gall bladder (lime arrow). With a cortical cyst at the left kidney (orange ovoid-shape).

Bifascicular heart block with electrocardiographic S1S2S3 pattern in pulmonary nodule and pneumatocele with coronary spasm was the most probable diagnosis. The patient was presented within 3 weeks of at-home treatment nearly, after clinical and workup improvement. The patient was continued on aspirin tablets (75 mg, OD), diltiazem tablets (75 mg, OD), nitroglycerin retard capsules (2.5 mg, BID), torsemide tablets (10 mg, fasting, OD), and long-acting insulin (45 units, in 2 divided doses). Future cardiac and chest follow-up was recommended.

Discussion

Overview:

- A 66-year-old widow housewife Egyptian female diabetic hypertensive patient presented to the physician outpatient clinic with right bundle branch block with left anterior fascicular block, and ischemic heart disease.
- The primary objective for my case study was the presence of a female diabetic hypertensive patient who presented with RBBB, LAFB, and IHD in the POC.
- The secondary objective for my case study was the question of; how did you manage the case at home?
- Interestingly, associated RBBB in the pathological LAD may play an essential role in the present new left anterior fascicular block.
- The reversal of left anterior fascicular block to RBBB with physiological LAD may strengthen the role of treatment.
- There is no history as if the present bifascicular block is a new onset.
- The dramatic reversal of ST-segment depression in V4-6 leads may be strengthening the coronary spasm with the efficacy of treatment.
- The present S1S2S3 pattern indicates that the S-waves voltage is more than 1.5 mm in I, II, and III a prognostic ECG finding such as RBBB[5].

- The presence of atelectatic bands and pneumatocele maybe has a role in the ECG changes.
- Left lung nodule may take a wide differential diagnosis such as TB, tumor, and lung abscess.
- The current of diabetes and hypertension is considered other risk factors.
- Elderly female sex, diabetes, hypertension, atelectatic bands, pneumatocele, pulmonary nodule, CAS, S1S2S3, and bifascicular heart block are risk factors.
- Acute non-STEMI was the most probable electrocardiographic differential diagnosis for the current case study. But there is no ST-segment elevation that characterized AMI involving at least two consecutive leads.
- There are no similar conditions for comparison.
- An unavailability of a lung biopsy for pulmonary nodule is the limitation of this case study.

Conclusion and Recommendations

- Bifascicular heart block especially the left anterior fascicular block may be temporary and drug-responsive.
- The presence of the elderly female sex, diabetes, hypertension, atelectatic bands, pneumatocele, pulmonary nodule, coronary artery spasm, S1S2S3, and bifascicular heart block are constellation prognostic factors for the severity of the disease.
- At-home management should be not discouraged at all even in a risky case.

Conflicts of interest:

- There are no conflicts of interest.

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References

1. [Olshansky B, Goldschlager N. Chapter-2: Bradyarrhythmias, Conduction System Abnormalities. *Arrhythmia Essentials* \(Second Edition\), 2017: 28-86.](#)
2. Burns Ed, Buttner R. Bifascicular Block. Available at: <https://litfl.com/bifascicular-block-ecg-library/> (Accessed; Dec 9, 2021)
3. [Denes P, Dhingra RC, Wu D, Wyndham CR, Amat-y-Leon F, Rosen KM. Sudden Death in Patients With Chronic Bifascicular Block. *Arch Intern Med.* 1977;137\(8\):1005–1010.](#)
4. [Witting DM, Mattu A, Rogers R, Halvorson C. Simultaneous T-Wave Inversions In Anterior And Inferior Leads: An Uncommon Sign Of Pulmonary Embolism. *The Journal of Emergency Medicine.* 2012; 43\(2\):228–235.](#)
5. [Calò L, et al. A New ECG Marker of Sudden Death in Brugada Syndrome: the S wave in lead I. *JAAC.* 2016; 67 \(12\):10.](#)
6. [Moller JH, White RD, Anderson RC, Adams P Jr. Significance of the S1S2S3 electrocardiographic pattern in children. *Am J Cardiol.* 1965 Oct; 16 \(4\):524-33.](#)
7. [Lanza GA, Careri G, and Crea F. Mechanisms of Coronary Artery Spasm. *Circulation.* 2011, Oct 18; 124\(16\):1774-1782.](#)
8. [Yasue H, Nakagawa H, Itoh T, Harada E, Mizuno Y. Coronary artery spasm-Clinical features, diagnosis, pathogenesis, and treatment. *Journal of Cardiology.* 2008; 51:2–17.](#)
9. [Yasue H, Mizuno Y, Harada E. Coronary artery spasm - Clinical features, pathogenesis and treatment. *Proc Jpn Acad Ser B Phys Biol Sci.* 2019;95\(2\):53-66.](#)