

Bifascicular Block with Electrocardiographic Sisiisiii Pattern in Mild Covid-19 Pneumonia with Slight Pleural Effusion; Differentiation versus Outcome

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Abstract

Rationale: Cardiovascular and chest involvement in a pandemic COVID-19 virus infection may be vital. Bifascicular heart block is affecting the conduction delay or block below the AVN in two of the three fascicles. There is a correlation between mortality with sudden cardiac death (SCD) and bifascicular block. SISIISIII pattern is meaning that the S-waves of amplitude is more than 1.5 mm in I, II, and III. It is a variable prognostic electrocardiographic finding.

Patient concerns: A 67-year-old, retired officer, smoker, married, Egyptian male patient was admitted to the intensive care unit with right bundle branch block, left anterior fascicular block, and mild COVID-19 pneumonia with slight pleural effusion.

Diagnosis: Bifascicular block with ECG SISIISIII pattern in mild COVID-19 pneumonia with slight pleural effusion.

Interventions: Electrocardiography, oxygenation, non-contrast chest CT, and echocardiography.

Outcomes: Good response and better outcomes despite the presence of several remarkable risk factors were the results.

Lessons: Associated hypoxia in the current COVID-19 pneumonia may play an essential role in the present new bifascicular heart block. SISIISIII pattern represents a variable prognostic ECG finding such as RVH, pulmonary embolism, and congenital heart disease. The presence of left ventricular septal hypertrophy is considered another risk. The presence of the elderly male sex, heavy smoker, COVID-19 pneumonia, pleural effusion, bifascicular heart block, SISIISIII pattern, and interventricular septal hypertrophy are prognostic factors for the severity of the disease.

Keywords: COVID-19 pneumonia; bifascicular block; SISIISIII pattern; left anterior fascicular block; pleural effusion

Introduction

Incomplete trifascicular block and Mobitz type II atrioventricular block were reported in the case of COVID-19. Bifascicular block is affecting the conduction delay or block below the AVN in two of the three fascicles [2]. Conduction to the ventricles will be thorough the single remaining fascicle [3]. The ECG will show typical features of **the right bundle branch block (RBBB)** plus either left (LAD) or right axis deviation (RAD). **RBBB** in association with a left anterior fascicular block (LAFB) is the most frequent of the two types. This is due to a single coronary artery blood supply (LAD) to the anterior fascicle. **RBBB** in association with a left posterior fascicular block (LPFB) is less common due to a dual blood supply (right and left circumflex arteries). The above association may be accompanied by more extensive underlying cardiac pathology [3].

It is usually associated with structural heart disease (SHD) in about 50-80%. But it may present with extensive fibrosis of the conducting system. So, progresses risk to be complete heart block (CHB) if there are additional damage to the third remaining fascicle (1-4% per year). The patients may be asymptomatic. Syncope occurs in a 17% of annual risk of progression [2]. The presence of syncope or presyncope in the situation of a bifascicular block is a mark for hospitalization. Structural heart disease (SHD) such as ischemic heart disease (40-60% cases), aortic stenosis, anterior MI (5-7% of acute AMI), Lenègre-Lev disease, congenital heart disease, and hyperkalemia are common causes of bifascicular heart block [3]. A new-onset bifascicular block in the condition of chest pain is highly associated with proximal LAD occlusion [3]. There is a correlation between mortality with sudden cardiac death (SCD) and chronic

bifascicular block [4]. The association of SCD with coronary disease and ventricular dysrhythmia suggested ventricular fibrillation (VF) as a suggested mechanism [4]. But, if idiopathic syncope after work-up, the pacing is recommended [2]. Cardiac affection in COVID-19 virus infection, as if primarily occurred by the virus or its clinical complications, or its medications cannot be ignored [1]. An incidence of pleural effusions is uncommon in COVID-19 [8]. SISIISIII pattern is meaning that the S-waves of amplitude is more than 1.5 mm in I, II, and III. It is one of the traditional findings which is associated with pulmonary embolism [5]. A SIRIIRIII pattern and SIRIIRIII pattern with a QRS-complex less than 0.12 seconds can be produced by right ventricular hypertrophy (RVH) or zonal right ventricular block [6]. about 90% of SISIISIII pattern cases are associated with congenital cardiac defects which were generally associated with manifestations of RVH and RV hypertension. The pattern is most frequent in children with complete transposition of the great vessels (TGA), associated interventricular communications, and in children having VSD with pulmonary hypertension [7]. Pleural effusion is considered an indicator for severe inflammatory state and carries poor clinical outcomes, and might be an integral risk factor in critical COVID-19 infection [9].

Case presentation

A 67-year-old, retired officer, smoker, married, Egyptian male patient was presented to the emergency department (ED) with dizziness, palpitations, and acute confusion state. He gave a recent history of fever, fatigue, dry cough, generalized body aches, anorexia, and loss of smell 3 days ago. There is a recent contact with a confirmed case of COVID-19 pneumonia. He gives a history of chronic hypertension on captopril (5mg; OD). He is smoking about 20 cigarettes for 28 years. The patient denied a history of other cardiovascular diseases, drugs, or other special habits. Informed consent was taken. Upon general physical examination; generally, the patient was anxious, distressed, with a regular pulse rate of VR; 74 bpm, blood pressure (BP) of 150/90 mmHg, respiratory rate of 23 bpm, the temperature of 37.7 °C, and pulse oximeter of oxygen (O₂) saturation of 89%. Currently, the patient was admitted to the critical care unit with **right bundle branch block (RBBB)**, left anterior fascicular block (LAFB), and mild COVID-19 pneumonia with slight pleural effusion. Initially, the patient was treated with O₂ inhalation by O₂

cylinder (100%, by nasal cannula, 5L/min). The patient was maintained treated with cefotaxime; (1000 mg IV every 8hours), azithromycin (500 mg PO single daily dose), oseltamivir (75 mg PO twice daily only for 5 days), and paracetamol (500 mg IV every 8 hours as needed). SC enoxaparin 80 mg twice daily), aspirin tablet (75 mg, once daily), clopidogrel tablet (75 mg, once daily), and hydrocortisone sodium succinate (100 mg IV every 12 hours) were added. The patient was daily monitored for temperature, pulse, blood pressure, and O₂ saturation. Serial ECG tracings through the hospital admission stay were done. The initial ECG tracing was done on the ICU admission of VR; 74 showed NSR with RBBB, LAFB, and SISIISIII pattern (Figure 1A). The second ECG tracing was done within 8 minutes of the above tracing of VR; 76 showed the same abnormalities (Figure 1B). Laboratory workup was done during the third day of the presentation. The initial complete blood count (CBC); Hb was 14.4 g/dl, RBCs; 5.10*10³/mm³, WBCs; 6.19*10³/mm³ (Neutrophils; 61.9 %, Lymphocytes: 27.6%, Monocytes; 8.9%, Eosinophils; 1.3% and Basophils 0.3%), Platelets; 184*10³/mm³. S. Ferritin was high; 478 ng/ml. D-dimer was high (0.756 ng/ml). CRP was high (41 g/dl). LDH was high (500 U/L). SGPT was normal (21.45 U/L), SGOT was normal (20.72 U/L). Serum albumen was low (2.5 gm/dl). Serum creatinine was normal (0.78 mg/dl) and blood urea was normal (17 mg/dl). RBS was normal (119 mg/dl). Plasma sodium was normal (139mmol/L). Serum potassium was normal (4.4 mmol/L). Ionized calcium was normal (1.3 mmol/L) and total calcium was normal (10.4 mg/dl). The troponin test was negative (0.03 U/L). CK-MB was normal (8 U/L). The initial CXR plain film was done during the second day of the presentation showing mild right pleural effusion and mild left parahilar ground-glass opacities (Figure 2A). The first chest CT without contrast was done during the second day of the presentation showing mild right pleural effusion and mild left perihilar ground-glass opacities (Figure 2B). Echocardiography was done during the third day of the presentation with EF; 73.61 % showed diastolic dysfunction with reversed EA ratio, IVS hypertrophy (18.89 mm), and mitral regurgitation (Figure 2C). Bifascicular block with ECG SISIISIII pattern in mild COVID-19 pneumonia with slight pleural effusion was the most probable diagnosis. The patient was discharged within 3 days of hospital admission nearly, after clinical and workup improvement. The patient was continued on aspirin tablets (75 mg, OD) and captopril tablets (5 mg; OD). Further cardiac and chest follow-up was advised.

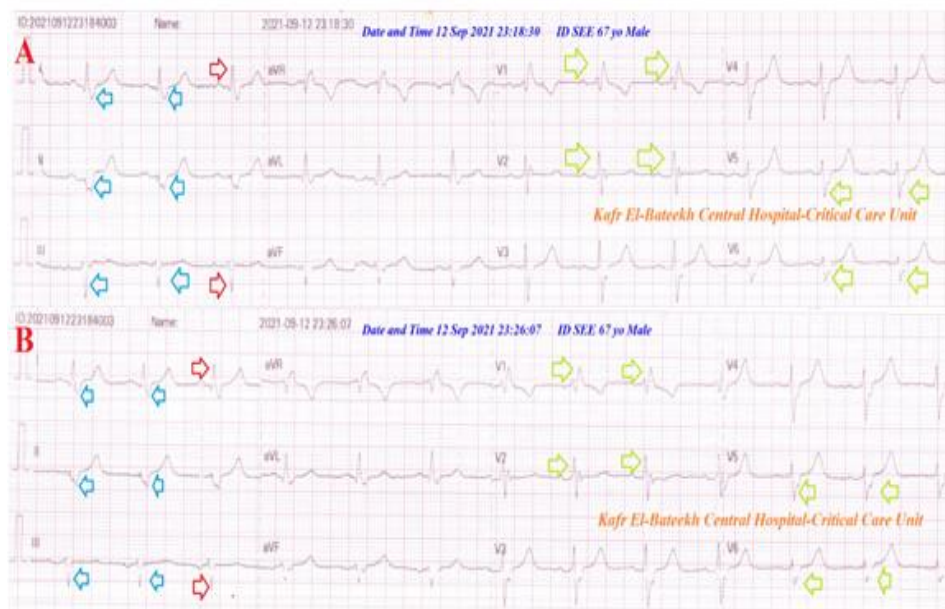


Figure-1: Serial ECG tracings; A. tracing was done on the ICU admission of VR; 74 showing NSR with RBBB (lime arrows), LAFB (red arrows), and SISIISIII pattern (light blue). B. tracing was done within 8 minutes of the above tracing of VR; 76 showing the same abnormalities.

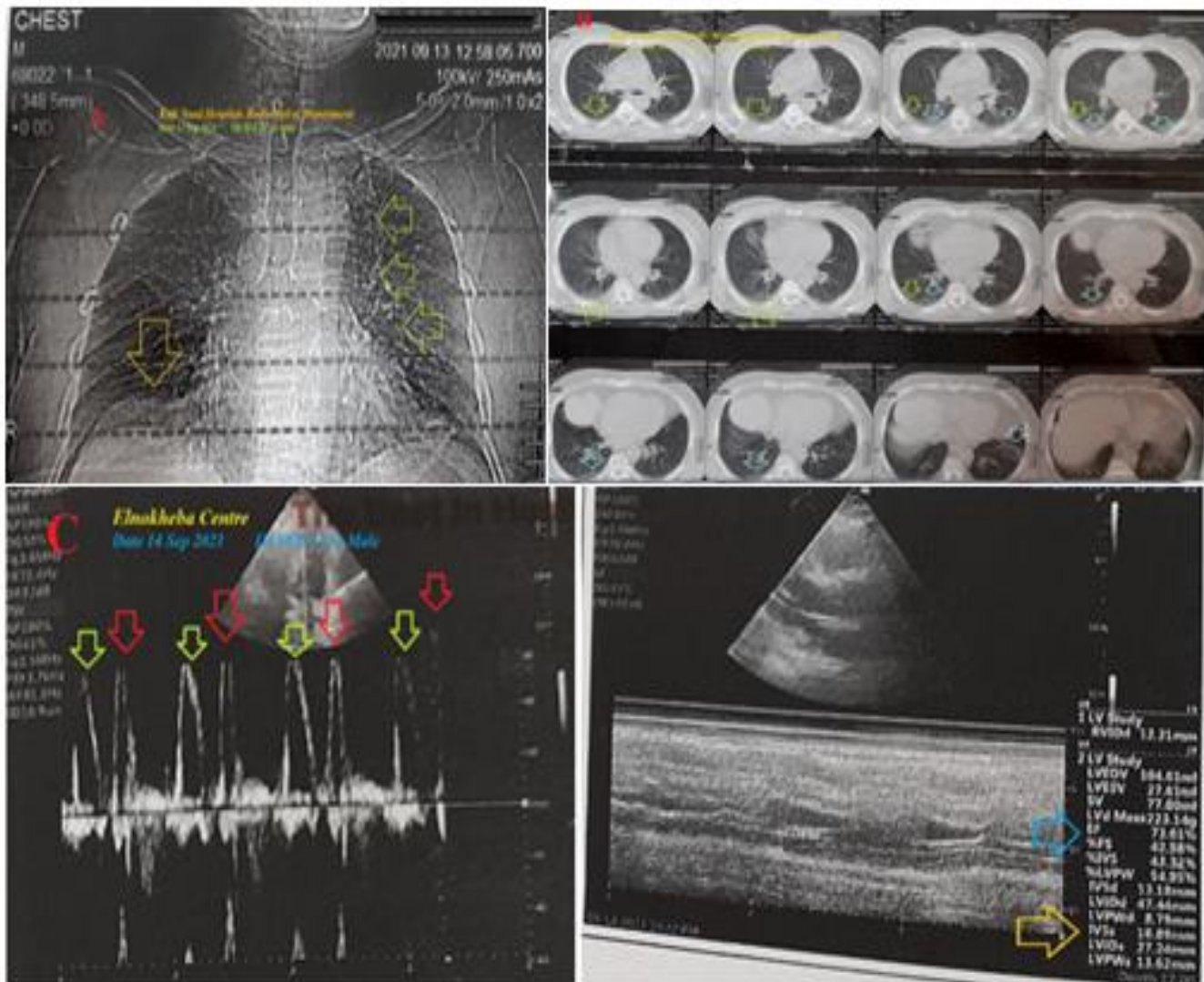


Figure 2: (A). CXR plain film was done during the second day of the presentation showing mild right pleural effusion (golden arrow) and mild left parahilar ground-glass opacities (lime arrows). (B). Chest CT without contrast was done during the second day of the presentation showing mild right pleural effusion (lime arrow) and mild left parahilar ground-glass opacities (light blue arrows). (C). Echocardiography was done during the third day of the presentation with EF; 73.61 % (light blue arrow) showing diastolic dysfunction with reversed EA ratio (lime and red arrows) and IVS hypertrophy (18.89 mm; orange arrow).

Discussion

• Overview:

• A 67-year-old, retired officer, smoker, married, Egyptian male patient was admitted to the intensive care unit with **right bundle branch block**, **left anterior fascicular block**, and mild COVID-19 pneumonia with slight pleural effusion.

• **The primary objective** for my case study was the presence of a patient who presented with a **right bundle branch block**, **left anterior fascicular block**, and mild COVID-19 pneumonia with slight pleural effusion in the ICU.

• **The secondary objective** for my case study was the **question** of; how did you manage the case at home?

• There was a history of contact with a confirmed COVID-19 case. The presence of confirmed COVID-19 case, left ground-glass consolidation, and laboratory COVID-19 suspicion on top of clinical COVID-19 presentation will strengthen the COVID-19 diagnosis.

- Interestingly, associated hypoxia in the current COVID-19 pneumonia may play an essential role in the present new bifascicular heart block.
- The dramatic response of the associated symptoms may be strengthening this suggestion.
- There is an existence of SISIISIII pattern with the S-waves of amplitude is more than 1.5 mm in I, II, and III. It represents a variable prognostic ECG finding such as RVH, pulmonary embolism, and congenital heart disease [5-7].
- The presence of left ventricular septal hypertrophy is considered another risk.
- Elderly male sex, heavy smoker, COVID-19 pneumonia, pleural effusion, recurrent ischemic cerebrovascular **stroke**, renal impairment, ischemic heart disease, hypocalcemia, diabetes, ischemic variant premature ventricular contractions, and QRS-complex fragmentation are risk factors.
- **Acute myocardial infarction 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.

- I can't **compare** the current case with similar conditions. There are no similar or known cases with the same management for near comparison.
- The only limitation of the current study was the unavailability of coronary catheterization.

Conclusion and Recommendations

- Associated hypoxia in the current COVID-19 pneumonia may play an essential role in the present new bifascicular heart block.
- SISIIISIII pattern represents a variable prognostic ECG finding such as RVH, pulmonary embolism, and congenital heart disease.
- The presence of left ventricular septal hypertrophy is considered another risk.
- The presence of the elderly male sex, heavy smoker, COVID-19 pneumonia, pleural effusion, **bifascicular heart block**, SISIIISIII pattern, and interventricular septal hypertrophy are prognostic factors for the severity of the disease.
- The clinical and electrocardiographic response after using anti-COVID19 measures the signifying its role and suggest the diagnosis of COVID19 infection as a causation.

Conflicts of interest

- There are no conflicts of interest.

Abbreviations

COVID-19: Coronavirus disease 2019
 ECG: Electrocardiogram
 ED: Emergency department
 ICU: Intensive care unit
 LAFB: Left anterior fascicular block
 LPFB: Left posterior fascicular block
 O2: Oxygen
 RBBB: Right bundle branch block
 SCD: Sudden cardiac death
 SGOT: Serum glutamic-oxaloacetic transaminase
 SGPT: Serum glutamic-pyruvic transaminase

SHD: Structural heart disease

VR: Ventricular rate

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