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# Clinical Cardiology and Cardiovascular Medicine

Case Report

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## COVID-19 Pneumonia with Atrial Fibrillation, Coronary Spasm, and Wavy Triple Sign (Yasser's Sign); Dramatic Reversal at Home Management

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### Abstract

**Rationale:** A novel COVID-19 with a severe acute respiratory syndrome or pneumonia had arisen in Wuhan, China in December 2019. Emerging atrial fibrillation in COVID-19 patients is highly significant in cardiovascular medicine. A newly coronary artery spasm in the presentation of COVID-19 infection has certainly a risk impact on both morbidity and mortality of COVID-19 patients. Wavy triple an electrocardiographic sign (Yasser Sign) is an innovated sign of hypocalcaemia linked to tachypnea and acute respiratory distress.

**Patient concerns:** An elderly male COVID-19 patient presented to physician outpatient clinic with bilateral pneumonia, atrial fibrillation, evidence of coronary artery spasm, and Wavy triple an electrocardiographic sign (Yasser Sign).

**Diagnosis:** COVID-19 pneumonia with coronary artery spasm and the Wavy triple an electrocardiographic sign (Yasser Sign).

**Interventions:** Chest CT scan, electrocardiography, oxygenation, and echocardiography.

**Outcomes:** Gradual dramatic clinical, electrocardiographic, and radiological improvement had happened.

**Lessons:** The reversal of electrocardiographic ST-segment depressions in a COVID-19 patient after adding oral nitroglycerine is an indicator for the presence of coronary artery spasm. It signifies the role of the anti-infective drugs, anticoagulants, antiplatelet, and steroids in COVID-19 patients with bilateral pneumonia, AF, coronary artery spasm are effective therapies. The disappearance of AF after initial therapy may a guide for a good prognosis in this case study. The evanescence of Wavy triple ECG sign as a hallmark for the existence of the Movable-weaning phenomenon of hypocalcaemia is recommended for further wide-study.

**Keywords:** COVID-19, Coronavirus, Bilateral pneumonia, Atrial fibrillation, Wavy triple electrocardiographic sign, Movable-weaning phenomenon.

**Abbreviations:** SARS-Severe Acute Respiratory Syndrome, HF-Heart Failure, VTE-Venous Thromboembolism, AF-Atrial Fibrillation, CBC-Complete Blood Count, CAS-Coronary Artery Spasm, COVID-19-Coronavirus Disease 2019, ECG-Electrocardiography, IV-Intravenous, IHD-Ischemic Heart Disease, IVB-Intravenous Bolus, O<sub>2</sub>-Oxygen, POC-Physician Outpatient Clinic, SGOT-Serum Glutamic-Oxaloacetic Transaminase, SGPT-Serum Glutamic-Pyruvic Transaminase, VR-Ventricular Rate, HF-Heart Failure, VTE-Venous Thromboembolism.

### Introduction

The initial presentation of a novel Coronavirus-2 (COVID-19) that is resulting in Severe Acute Respiratory Syndrome (SARS) had appeared in Wuhan, China in December 2019 [1]. COVID-19 Disease is a highly communicable, rapidly spread, lethal worldwide disease [2]. Despite COVID-19 disease was primarily presented with respiratory symptoms, but cardiovascular involvements were common and accompanied by higher mortality among these patients [3]. However, cardiac manifestations represent a late phenomenon of the viral respiratory infection in COVID-19 patients. Myocardial infarction, arrhythmias, cardiac arrests, Heart Failure (HF), and Venous Thromboembolism (VTE) are frequent cardiovascular complications in COVID-19 patients that is varying from 7.2% up to 33% [3]. Arrhythmias are commonly recognized sequel in COVID-19 patients, with Atrial Fibrillation (AF) being the most common form. An electrical, calcium handling and structural remodeling have represented keystone in understanding AF pathogenesis [4].

The clinical manifestations of AF are highly variable and the actual mechanisms of AF are still vague in a big sector of patients [5]. The underlying pathogenesis of AF in COVID-19 patients is still idiopathic [4]. According to current literature, AF was detected in 19% to 21% among COVID-19 patients [4]. The incidence of AF is usually high in patients with severe pneumonia, SARS, septic shock, and the during hospitalization [4]. According to the Danish Nationwide Registry (DNR), new-onset AF was reduced by 47% in the first three weeks of the national lockdown in comparison with the simultaneously the past year [6]. A reduction in angiotensin-converting enzyme 2 (ACE-2) receptor availability, CD147 and sialic acid-spike protein reaction, increased inflammatory signaling subsequently culmination in an inflammatory cytokine storm, direct viral endothelial damage, acute electrolytes disturbance, acute acid-base imbalance, and increased adrenergic drive are proposed putative mechanisms in the pathophysiology of COVID-19 related-AF [7].

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Currently, therapy of AF with Antiarrhythmic Drugs (AADs), and anticoagulants are complex, suboptimal, and are accompanied by anxious side effects [4]. Acute Coronary Syndrome (ACS) due to a Coronary Artery Spasm (CAS) can occur in a severe acute respiratory syndrome in COVID-19 patients [8]. Despite the actual mechanisms of CAS in COVID-19 patients are multifaceted, but, it still unknown. Hypercontractility of coronary smooth muscle is usually induced by a rise of IC calcium (CA++) especially with elevated CA++ sensitivity are proposed mechanisms in understanding COVID-19 virus-inducing CAS [8]. However, CAS may occur in patients with established atherosclerotic coronary lesions. Importantly, inflammatory processes, IL-6 polymorphism, and oxidative stress may implicate in the pathogenesis of COVID-19 virus-inducing CAS [9]. Moreover, a major systemic inflammatory response, endothelial dysfunction, and activation of the ACE-2 receptor may play a role in inducing coronary artery spasm in COVID-19 infection [10].

Wavy triple an electrocardiographic sign (Yasser Sign) is a new innovated diagnostic sign in hypocalcaemia [11]. The author interpretations for this sign are based on the following;

- Different successive three beats in the same lead are affected.
- A Wavy triple sign can affect all ECG leads.
- An associated elevated beat is seen with the first of the successive three beats, a depressing beat with the second beat, and an isoelectric ST-segment in the third one.
- The elevated beat is either accompanied by ST-segment elevation or just an elevated beat above the isoelectric line.
- Also, the depressed beat is either associated with ST-segment a depressing or just depressed beat below the isoelectric line.
- The configuration for depressions, elevations, and isoelectric ST-segment for the subsequent three beats is variable from case to case.

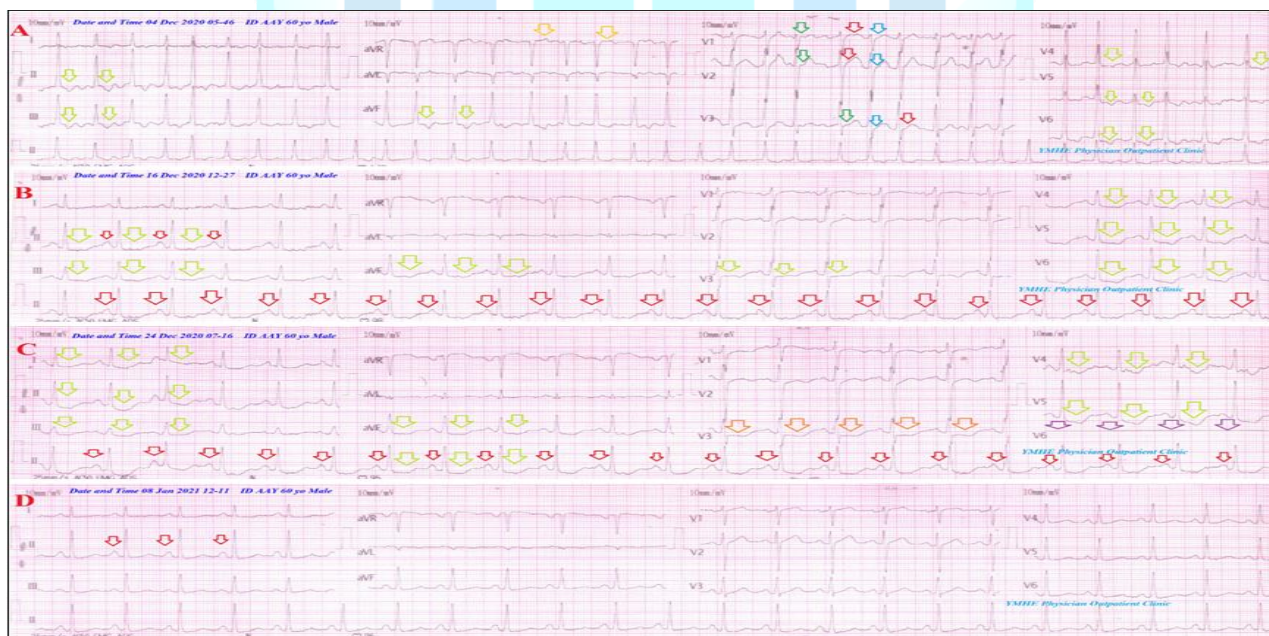
So, this arrangement is non-conditional. This is meaning the sign conditionally no affect specific ECG partition e.g., inferior, anterior, or lateral, etc. Mostly, there is no participation among the involved leads.

Thus, the sign is not conditionally included in an especial coronary artery for the affected leads [11].

## Case Presentation

A 60-year-old married male, farmer, Egyptian patient presented to the Physician Outpatient Clinic (POC) with acute tachypnea, chest pain, and palpitations. Fatigue, loss of appetite, and generalized body aches were associated symptoms. He gave a history of tachypnea for 4 days. Informed consent has been signed by the patient but unfortunately, there was no ethical approval. Currently, he had a history of contact in the past 7 days with his son who confirmed a COVID-19 patient. Upon general physical examination; generally, the patient was tachypneic, distressed, with an irregular pulse rate (atrial fibrillation of VR of 160), blood pressure (BP) of 140/80 mmHg, respiratory rate of 40 bpm, the temperature of 39.5°C, and pulse oximeter of oxygen (O<sub>2</sub>) saturation of 88%. He seemed thin and long. No more relevant clinical data were noted during the physical examination.

The patient was treated at home with COVID-19 pneumonia, atrial fibrillation, coronary spasm, and Wavy triple sign or Yasser's sign. Initially, the patient was treated with O<sub>2</sub> inhalation by O<sub>2</sub> cylinder (100%, by nasal cannula, 5L/min). The patient was maintain treated with cefotaxime; (1000 mg IV every 8 hours), 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), diltiazem tablet (60 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 O<sub>2</sub> saturation. The initial ECG on presentation showing atrial fibrillation (of VR of 160) with a T-wave inversion in inferior leads (II, III, and aVF), in anterior leads (V4-6 leads), and an upright T-wave in aVR lead. There is a Wavy triple sign of hypocalcaemia or Yasser's sign-in V1-3 leads (Figure 1A).

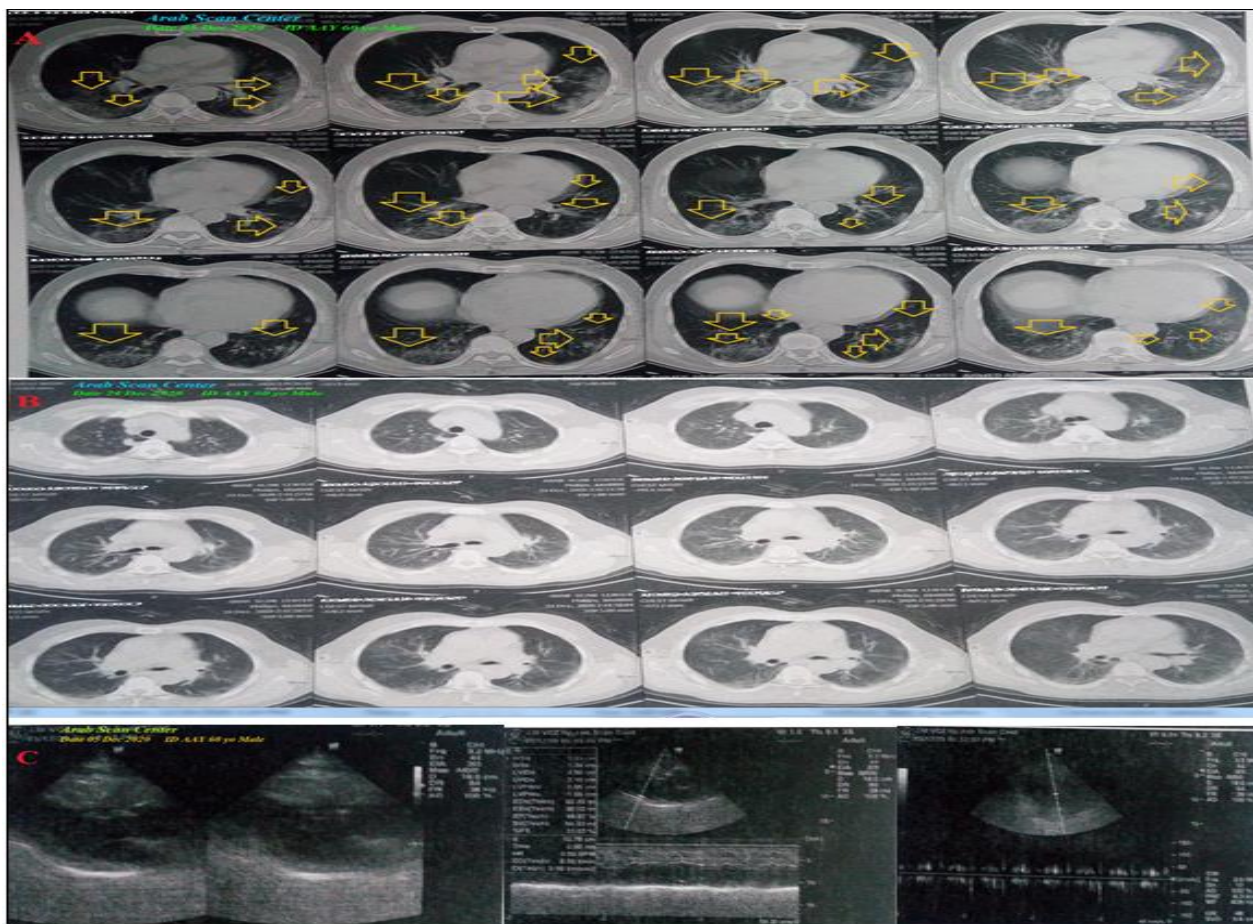


**Note:** A: Tracing was done on the initial ECG on presentation showing atrial fibrillation (of VR of 160) with a T-wave inversion in inferior leads (II, III and aVF), in anterior leads (V4-6 leads) (lime arrows), and upright T-wave in aVR leads (orange arrows). There is a Wavy triple sign of hypocalcaemia or Yasser's sign-in V1-3 leads (red, green, and blue arrows). B: Tracing was taken within 13 days of treatment showing down sloping ST-segment depressions in inferior leads (II, III and aVF), in anterior leads (V3-6 leads) (lime arrows), with normal sinus rhythm (of VR of 98). There are also peaked P-wave in lead II (red arrows) and biphasic in V1 lead. C: Tracing was taken within 20 days of treatment showing down-sloping ST-segment depressions in inferior leads (II, III, and aVF), in anterior leads (V3-6 leads) ± V6 (missed lead; purple arrows), and straight ST-segment depressions in V3 lead (orange arrows) with normal sinus rhythm (of VR of 94). There are also still peaked P-wave in lead II (red arrows) and biphasic in V1 lead. D: Tracing was taken within 35 days of treatment showing normalization of above ST-segment depressions with normal sinus rhythm of VR 98. There are also still peaked P-wave in lead II (red arrows) and biphasic in V1 lead.

**Figure 1:** Serial ECG tracings.

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**Figure 2:** A: Chest CT scan was done on presentation showing bilateral multiple patchy ground-glass pulmonary consolidations (orange arrows); B: Chest CT scan was done within 20 days of the presentation showing nearly dramatic improvement of the above ground-glass consolidations. C: Echocardiography was done on the second day of the presentation showing no abnormality detected with an EF of 58%.

The patient was tested for latent tetany which was positive. The initial Complete Blood Count (CBC); Hb was 14.2 g/dl, RBCs;  $4.83 \times 10^3/\text{mm}^3$ , WBCs;  $5.29 \times 10^3/\text{mm}^3$  (Neutrophils: 76%, Lymphocytes: 20%, Monocytes: 3%, Eosinophils: 1% and Basophils 0%), Platelets;  $142 \times 10^3/\text{mm}^3$ . S. Ferritin was high; 547 ng/ml. D-dimer was high (563 ng/ml). CRP was high; 48 g/dl. LDH was high; 776 U/L. SGPT was normal; 25 U/L, SGOT was normal; 42 U/L. Serum creatinine showed mild elevation; 1.5 mg/dl and blood urea; showed mild elevation; 110.7 mg/dl was high. RBS was; 91 mg/dl. Ionized calcium was mildly low; 0.71 mmol/L.

The troponin test was positive. After 21 days of management; RBS was normal; 119 mg/dl. CBC; Hb was 12.7 g/dl, RBCs;  $4.29 \times 10^3/\text{mm}^3$ , WBCs;  $5.84 \times 10^3/\text{mm}^3$  (Neutrophils: 68%, Lymphocytes: 25%, Monocytes: 6%, Eosinophils: 1% and Basophils: 0%), Platelets:  $85 \times 10^3/\text{mm}^3$ . Serum ferritin was normal; 291 ng/ml. D-dimer was normal (100 ng/ml), CRP was negative (0.4 g/dl), LDH was still high; 624.94 U/L. SGPT was normal; 19 U/L, SGOT was normal; 37 U/L. Serum creatinine; 1.3 mg/dl and blood urea; 49.4 mg/dl were normal. Ionized calcium was normal; 1.23 mmol/L. The troponin test had become negative. The first chest CT scan was done on presentation showing bilateral multiple patchy ground-glass pulmonary consolidations (**Figure 2A**). Serial ECG tracings were done. ECG tracing was taken within 13 days of treatment showing down-sloping ST-segment depressions in inferior leads (II, III, and aVF), in anterior leads (V3-6 leads), with normal sinus rhythm (of VR of 98).

There are also peaked P-wave in lead II and biphasic in V1 lead (**Figure 1B**). ECG tracing was taken within 20 days of treatment showing down-sloping ST-segment depressions in inferior leads (II, III, and aVF), in anterior leads (V3-6 leads)  $\pm$  V6 (missed lead), and straight ST-segment depressions in V3 lead with normal sinus rhythm (of VR of 94). There are also still peaked P-wave in lead II and biphasic in V1 lead (**Figure 1C**). An oral nitroglycerine capsule (2.5 mg, twice daily) was added. The last chest CT scan was done within 20 days of the presentation showing nearly dramatic improvement of the above ground-glass consolidations (**Figure 2B**). Echocardiography showed no detected abnormality with an EF of 58% (**Figure 2C**). COVID-19 pneumonia with coronary artery spasm and the Wavy triple an electrocardiographic sign (Yasser Sign) was the most probable diagnosis.

ECG tracing was taken within 35 days of treatment showing normalization of above ST-segment depressions with normal sinus rhythm of VR 98. There are also still peaked P-wave in lead II and biphasic in V1 lead. (**Figure 1D**). Within 24 days of the above management, the patient finally showed nearly complete clinical, radiological, and laboratory improvement. The patient was continued on aspirin tablet (75 mg, once daily), oral nitroglycerine capsule (2.5 mg, twice daily) and diltiazem tablet (60 mg, once daily), oral calcium, and vitamin-D preparation for 30 days with further recommended cardiac and chest follow up.

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## Discussion

**Overview:** An elderly farmer male COVID-19 patient presented to physician outpatient clinic with bilateral pneumonia, AF, evidence of coronary artery spasm, and Wavy triple an electrocardiographic (ECG) sign or Yasser Sign of hypocalcemia.

The objective primary for my case study was the presence of COVID-19 pneumonia, AF, evidence of coronary artery spasm, and Wavy triple an ECG sign (Yasser Sign) of hypocalcemia in POC.

The secondary objective for my case study was the question of; How did you manage the case?

- There was a history of direct contact to confirmed the COVID-19 case.
- The presence of direct contact to confirmed the COVID-19 case, and bilateral ground-glass consolidation on top of acute tachypnea will strengthen the COVID-19 diagnosis.
- The tachypnea, hypoxia, consolidation, electrocardiographic P-pulmonal, and elevated d-dimer are highly suggestive of associated pulmonary embolism.
- An associated marked elevated d-dimer, IHD, and hypocalcemia in the COVID-19 case presentation may carry a bad prognostic outcome and is indicating a high-risk condition.
- There is a dramatic reversal of ST-segment depressions in a COVID-19 patient after adding oral nitroglycerine is an indicator for the presence of coronary artery spasm.
- The presence of ST-segment depressions in ECG may be interpreted as accompanied by severe specific ischemic myocardial insult.
- The dramatic reversal of ST-segment depressions in ECG may be interpreted as a coronary artery spasm. Hypoxia and suspected pulmonary embolism were possible mechanisms.
- The disappearance of AF after initial therapy may a guide for a good prognosis in this case study.
- The spontaneous evanescence of Wavy triple electrocardiographic sign from ECG V1-3 leads is a hallmark for the existence of the Movable-weaning phenomenon of hypocalcemia. Tachypnea was a possible cause of hypocalcemia and subsequent Wavy triple electrocardiographic and Movable-weaning phenomenon of hypocalcemia [11,12].
- A nearly complete clinical, radiological, and laboratory improvement that occurred after the management with anti-infective drugs, anticoagulants, steroids, and antiplatelet strongly implies their effects.
- The normal lymphocytic count does not exclude COVID-19 infection. But it carries a good prognosis.
- Blood pressure, respiratory rate, pulse, and O2 saturation are a strong guide for clinical follow-up in COVID-19 patients.
- A gradual decreasing the level of elevated CRP, d-dimer, and serum ferritin may be used as another good laboratory guide for follow-up for COVID-19 pneumonic patients.
- The serial change of radiological changes from normal chest CT to abnormal to normal at the end will strengthen the effectiveness of used drugs in this management.

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 the invasive test for coronary artery spasm.

## Conclusion and Recommendations

- It signifies the role of the anti-infective drugs, anticoagulants, antiplatelet, and steroids in COVID-19 patients with bilateral pneumonia, AF, coronary artery spasm are effective therapies.
- The disappearance of AF after initial therapy may a guide for a good prognosis in this case study.
- The evanescence of Wavy triple ECG sign as a hallmark for the existence of the Movable-weaning phenomenon of hypocalcaemia is recommended for further wide-study.

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