Acute Heart Failure and Complete AV Block in A Patient With Severe Covid-19 Pneumonia

Silvio A¹, Hugo RZ², Alan GV³, Juan RG³, Adriana TM⁴ and An Karla TM⁵

¹Department of Intensive Care Unit, National Institute of Health Sciences and Nutrition, “Salvador Zubiran”, 14000, Mexico City, Mexico.
²Department of Echocardiography, National Institute of Cardiology of Mexico, “Ignacio Chavez”, Mexico City, Mexico
³Department of Intensive Care Unit, Medica Sur: Clinical Foundation, Mexico City, Mexico
⁴Department of Surgery, National Institute of Cardiology of Mexico, “Ignacio Chavez”, Mexico City, Mexico
⁵Department of Echocardiography, National Institute of Cardiology of Mexico, “Ignacio Chavez”, Mexico City, Mexico

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1. Abstract
We describe a patient with severe COVID pneumonia, with acute heart failure, cardiogenic shock, and complete AV Block in a critical care unit designated to treat Covid-19 patients. Myocardial injury may occur in up to 31% of patients with Covid-19 pneumonia and has been related to increased mortality [1,2]. Whether myocardial injury might result from direct damage from the virus or related to complications of the disease is still unclear.

2. Case Report
A 65 years old male with a history of diabetes mellitus, presented to the emergency department with shortness of breath, fever, cough, and low oxygen saturation (SPO2 87%). Thoracic CT was performed, demonstrating typical Covid-19 findings. (Figure 1 panel C) Confirmatory RT-PCR and diagnosis of Severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) was made on April 20. PCR testing for other respiratory viruses was negative. Symptomatic treatment and thromboprophylaxis with low molecular weight heparin were instaurated.

Two days later, the patient progressed to hypoxemic respiratory failure requiring mechanical ventilation. The patient was admitted to the intensive care unit, hemodynamically stable, and responded well to mechanical ventilation with lung protection. The patient was doing better, and weaning protocol was already planned. However, on April 30, the patient suddenly presented with hypotension and bradycardia. A surface ECG showed a complete AV Block, with left bundle branch block (Figure 1, panel A). The patient was started on vasopressors, and a temporary pacemaker was placed. Initial high sensitivity troponin was elevated (1730 ng/ml), and BNP was normal, left ventricular function was reduced, and wall motion abnormalities in the apical segments were found (Figure 1, panel D and Video 1).

Differentials included Takotsubo cardiomyopathy, acute myocarditis, and acute coronary syndrome. Because of the previous risk factors and elevated high sensitivity troponin I level, coronary angiography was performed. Significant proximal stenosis in the left anterior descending artery was found. Percutaneous coronary intervention with a drug-eluting stent was performed in the context of cardiogenic shock. The patient improved progressively with the aid of levosimendan. Vasopressors and temporary pacemaker were successfully removed, and the patient was extubated 8 days later.
Cardiac Magnetic Resonance (CMR) showed reduced Left Ventricular Ejection Fraction (LVEF 27%) and sub-epicardial late gadolinium enhancement in the inferior septum and anterior wall (Figure 1, panel E and F), compatible with subacute myocarditis (videos 2 and 3). Latter findings made ischemic or Takotsubo cardiomyopathy unlikely. A few days later, he had hypotension and a new onset complete AV block with right bundle branch block and ST-segment depression in V1-V3 (Figure 1, panel B). Coronary angiography was performed to ensure stent patency and definitive pacemaker was placed. He was started in guideline directed medical treatment for heart failure. Endomyocardial biopsy was not performed due to clinical improvement and increased risk to health care providers. A few days later, he was discharged. On follow up one month later left ventricular function recovered.

3. Discussion
Myocarditis is a well-described feature of other viral illnesses; however, in patients with SARS-CoV-2, data is limited to a few case reports. Although myocardial injury is common in patients with severe disease. Histopathological studies have only shown a few interstitial mononuclear inflammatory infiltrates in the myocardium [3]. Cardiac magnetic resonance is a valuable tool for myocardial tissue characterization in vivo validated against histology in a wide range of clinical scenarios. Interestingly in patients with moderate to severe SARS-CoV-2 disease, CMR can detect Late Gadolinium Enhancement (LGE) in half of recovered patients who reported chest pain or palpitations [4]. Thus, myocarditis might be more common than expected. Complete AV block in patients with SARS-CoV-2 myocarditis might occur. The mechanism involved is yet to be defined. The high expression of Angiotensin-converting enzyme 2 in heart and vessels might pose these tissues as the primary target of the disease.

4. Conclusion
A better understanding of cardiac complications of SARS-Cov2 infection is needed to guide clinicians in the treatment of these patients.

5. Author Contributions
- Rodriguez-Zanella Hugo MD: Care of the patient, conceptualization, writing original draft, writing-review and editing, approval.
- Gutierrez-Villaseñor Alan O.MD: Care of the patient, conceptualization, writing original draft, writing-review and editing, approval.
- Romero-Gonzalez Juan P. MD: Care of the patient, data curation, review and editing, approval.
- Adriana Torres-Machorro MD: Care of the patient, data curation, review and editing, approval.
- Ana Karla Tobias Morales MD: Care of the patient, data curation, writing-review and editing, approval.
• Silvio A, Namendys Silva MD, MSc, FCCP, FCCM: Care of the patient, conceptualization, writing- review and editing.

**References:**


