Case Report

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COVID 19 with Cardiac Injury Complication : A Case Report

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Abstract

Background: The Corona virus Disease COVID-19 have been independently associated with the cause of pneumonia and acute respiratory distress syndrome with high risk of mortality. Mounting evidence substantiates the presence of cardiac injury in patients with COVID-19. Although a recent study reported that 12% of patients had COVID-19 associated acute cardiac injury.

Case presentation: A 38 year old male was admitted with pneumonia and cardiac symptoms. He was genetically confirmed as COVID-19 by swab PCR testing, 1 week after admission. He also had elevated CKMB and Hs troponin T level, high Ferritin level, CRP, lymphopenia, and a slight increase in N/L ratio. Chest radiography showed bilateral pneumonia. The patient was confirmed to the diagnosis of Myocardial injury. After receiving tocilizumab and immunoglobulin, his condition improved gradually with the declining laboratory inflammation marker, but there was a secondary infection with an increased of leucocyte and worsen chest radiography, escalating antibiotic and metilprednisolon was given, the patient gradually improving.

Conclusion: COVID-19 patients may develop cardiac complication such as cardiac injury or myocarditis, and this is our first case of COVID-19 infection complicated with cardiac injury.

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Keywords: COVID-19, coronavirus, cardiac injury, tocilizumab, chest Ct scan.

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Background

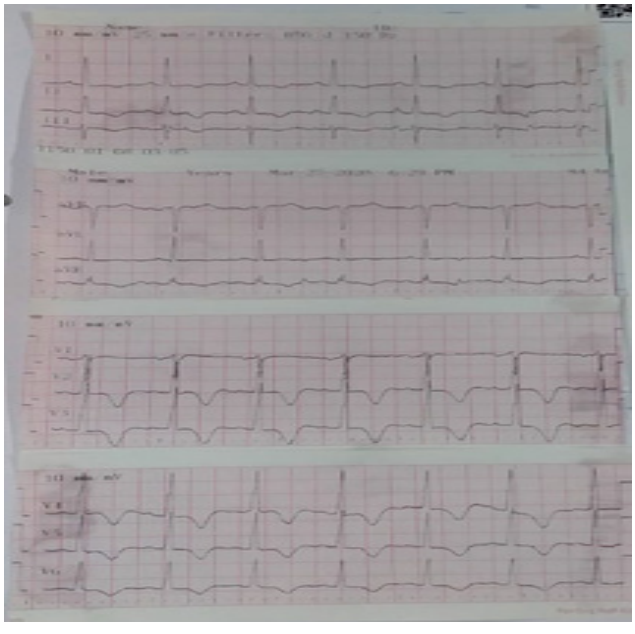
The first case of coronavirus disease 2019 (COVID-19) were reported on the 31 december 2019 in Wuhan City, Hubei Province of China. [1] Later on, a series of pneumonia cases have been reported in Jakarta, Indonesia since march 2020. The outbreak of a new coronavirus have clinical manifestations very similar to viral pneumonia. Common symptoms are fever, cough, myalgia and/or fatigue, even diarhhea. All patients had pneumonia and chest radiography showed

abnormalities.2 Complications include acute respiratory distress syndrome (ARDS), acute cardiac injury, and secondary infections. Here, we describe a case of COVID-19 infection complicated with myocardial Injury.

A 38 years old male was admitted to the hospital with symptoms of fever, cough, shortness of breath and chest tightness 3 days before admission. Two weeks prior to admission he was diagnosed with hypertension and was treated with telmisartan. He had no History of previous contact with COVID positive patient or history of travelling abroad. On arrival to the emergency department, physical examination revealed blood pressure of 130/90 mmHg, heart rate of 90x/mnt, oxygen saturation of 98% with nasal oxygen and body temperature of 38 ^{0}C. From cardiac auscultation, Heart sounds (S1 & S2) regular, no murmur, nor gallop. Lungs were within normal limits. No pitting edema on both extremities. A 12 lead electrocardiogram showed diffuse inverted T waves in almost all leads (II,III, aVF, V2-V6). (Figure 1A). Findings on the chest radiography was bilateral pneumonia in base of the lungs. (Figure 1B). Blood test showed elevated levels markers of myocyte necrosis (high-sensitivity troponin T level of 25.47 pg/mL and creatine kinase–MB level of 35.9 U/L). A normal N-Terminal brain natriuretic peptide (NT-Pro-BNP level) 41 Ng/L level. An increase of White cell counts, with low Lymphocyte (18 %) and a slight increase in netrofil lymphocyte ratio (3.78). Blood sample test also revealed increase in ALT, AST, Ferritin, LDH (lactate dehydrogenase, low in albumin, and a slight increase in C-reactive protein (CRP) and normal PCT (Procalcitonin). (Table 1).

The patient was admitted in our isolation ward with a diagnosis of suspected myocarditis and pneumonia. A Nasopharyngeal swab was performed with a positif result for SARS-CoV-2 on real-time reverse transcriptase-polymerase chain reaction assay. Unforfunately we cannot conduct an echocardiography due to lack of mobile echocardiography. and also based on a normal cardiac size from the chest radiogram and a normal Nt-Pro-BNP we assumed the patient was not in heart failure. On the two days of his hospitalization, the patient clinically deteriorated, his oxygen saturation was 89 % on NRM 15 Lpm, but his blood pressure and heart beat was relatively stable (120-70 mmHg and 90-95 x/mnt). We decided to treat him with Tocilizumab 4mg/kg iv drip, Immunoglobulin 400mg/kg/day for 10

A Electrocardiography



B. Chest Radiography

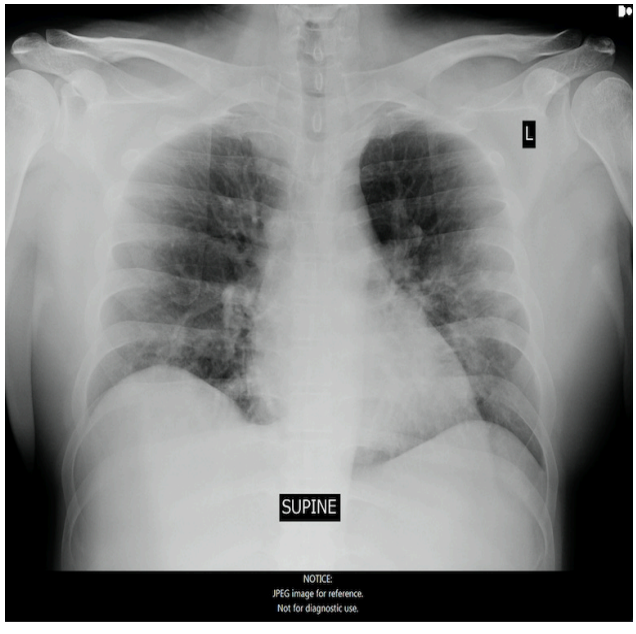


Figure 1. Electrocardiographic and Chest Radiographic Findings

A. Electrocardiography showing sinus rhythm with diffuse T-wave inversion in leads V2-V6 and II,III,avF & I,aVL.

B. Posteroanterior chest radiography at presentation showed bilateral pneumonia.

Table 1. Clinical Laboratory Results

Measure	Reference range	Result		
		Day 1	Day 13	**Day 29**
Red blood cell count	4.50- 5.50 10^6/µL	4.84	4.77	4.22
Hemoglobin	13.0- 16.0 g/dL	15.4	14.4	13.0
Hematocrit	40.0- 48.0 %	42.7	40.7	37.6
White blood cell count	5.00- 10.00 10^3/ µL	5.99	16.42	12.91
Lymphocyte count	20-40 %	20		15
Platelet count,	150- 400 10^3/ µL	191		292
Neutrophil to Lymphocyte Ratio	< 3.13	3.78		4.87
Sodium	135.0 – 147.0 mmol/L	136.7		
Potassium	3.50 – 5.00 mmol/L	3.15		
Chloride	94.0 – 111.0 mmol/L	98.8		
Ureum	10- 50 mg/dL	17	18	
Creatinine	<1.40 m/dL	0.73	0.48	
C-reactive protein	< 5.00 mg/L	36.13		4.60
Creatine kinase–MB	U/L	45		
High-sensitivity troponin T	Pg/mL	23.78		16.28
NT-proBNP	< 125 ng/L	41		
Albumin	3.50 – 5.20 g/dL	2.79		
ALT	10- 34 U/L	153	65	
AST	9 - 43 U/L	138	56	
D- Dimer	< 500 Ng/mL	1640	1120	420
Procalcitonin	<= 0.5 Ng/mL	0.325	0.055	
Ferritin	30-400 Ng/mL	1894	1894	457.10
LDH	240-480 U/L	827	827	

days, and hydroxychloroquine 200mg twice daily. We also give him supportive medication and antibiotics. Chest radiography was repeated on day 6 worsen with infiltrate and opacities in middle part of both lungs and his clinical state were relatively unchanged. We again planned to give him tocilizumab with a higher dosage (8mg/kg iv drip) but unfortunately the medicine was no longer available due to cease in manufacturing. We decided to give oseltamivir, hence the medicine only can be given by the government if the nasopharyngeal swab is positive. So we gave him oseltamivir twice daily 75mg for 10 days. On the 14th day of hospitalization blood test marker elevated (leukocyte 16.40 10^3 / µL) so we escalated the antibiotic from meropenem to piperacillin & tazobactam for 10 days and gave metilprednisolon and heparin drip, the patient clinically and laboratory improving, eventhough chest x ray stated otherwise. We conducted CT thoracal and revealed ground glass appearance and fibrosis in both lungs. He was discharge on day 30 of hospitalization with good clinical condition. (Figure 2.)

Discussion

We describe a patient with a history of hypertension admitted to the hospital with COVID-19 and myocardial injury. Our findings develop severe pneumonia with cardiac symptoms, as the following features: chest pain, shortness of breath, dry cough, fever and diarrhea. While the spectrum of clinical manifestation is highly related to the inflammation process of the respiratory tract, this case provides evidence of cardiac involvement

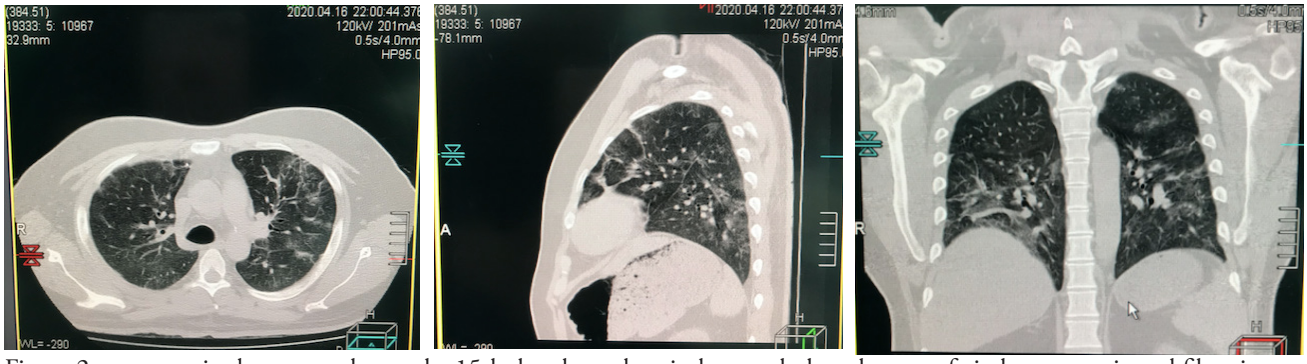


Figure 2. computerized tomography on the 15th day showed typical ground-glass changes of viral pneumonia and fibrosis.

as a possible phenomenon of the viral respiratory infection. Previous Coronavirus outbreaks have been associated with a significant burden of cardiovascular comorbidities and complications.[3] Furthermore, the severity of the primary respiratory syndrome and risk of adverse outcomes is increased in patients with pre-existing cardiovascular diseases. Hypotension, tachycardia, bradycardia, arrhythmia, or even sudden cardiac death are common in patients with SARS. Electrocardiographic changes and troponin elevation may signal underlying myocarditis. [4] The cardiovascular system is often involved in COVID-19 early, reflected in the release of highly sensitive troponin and natriuretic peptides, which are all extremely prognostic, particularly in those showing continued rise, along with cytokines such as IL-6.[5] Inflammation in the myocardium can result in myocarditis, heart failure, cardiac arrhythmias, acute coronary syndrome, rapid deterioration and sudden death.

The beta-coronavirus virus underlying COVID-19 strains from the same species as SARS and has recently been named SARS-CoV-2. SARS-CoV binds to cells expressing appropriate viral receptors, particularly angiotensin-converting enzyme 2 (ACE2). Angiotensin converting enzyme 2 is also expressed in the heart, providing a link between coronaviruses and the cardiovascular system. SARS-CoV can down-regulate myocardial and pulmonary ACE2 pathways, thereby mediating myocardial inflammation, lung oedema, and acute respiratory failure. [5] As in this case, hypertension was a predisposing factor causing a relatively young patient into a severe pneumonia and myocarditis, shown in the Increase of cardiac troponin levels as a sensitive marker of myocardial injury.

A rapid progression of the pneumonia could possibly due to virus overload called cytokines storm. Cytokine storm refers to the phenomenon of rapid and massive production of various cytokines in body fluid after the organism is infected with microorganisms, which is an important cause of acute respiratory distress syndrome and multiple organ failure. Cardinal features of unremitting fever, cytopenias hyperferritinemias, and pulmonary involvement is a hyperinflammatory syndrome in other word cytokine syndrome.[6] A study showed that after SARS-CoV infection, interferon-related cytokine storms may be involved in the immunopathology of SARS patients .[7] IL-6 is a cytokine that plays an important role in inflammatory reaction and immune response. [8] The patient had significantly elevated interleukin, shown from the high ferritin marker suggesting the presence of cytokine storms and also lymphopenia. Lymphopenia is a common feature in the patients with COVID-19 and might be a critical factor associated with disease severity and mortality. For this reason tocilizumab was recommended in COVID-19 patient to prevent or treat cytokines storms, function as an anti-IL6 reseptor antibody. [9] As seen in our patient, tocilizumab helped stabilize the patient condition by preventing the disease acceleration into ARDS (acute respiratory distress syndrome).

In parallel, we also give intravenous immunoglobulin, IVIG (intravenous immunoglobulin) is a blood product containing polyclonal immunoglobulin G isolated and pooled from healthy donors. As a complex preparation, it contains a large number of bioactive moieties, and the entirety of its effects is not yet fully understood. IVIG of higher dose has been a choice of immunomodulatory therapy for autoimmune or inflammatory disease and for prophylaxis and treatment of severe infections, especially in immunocompromised patients. [10] Considering its

efficacy in improving passive immunity and modulating immune inflammation and the overall safety profile, high-dose IVIG could be considered a promising option at the early stage of clinical deterioration of patients with COVID-19. Therefore delaying the acceleration of the disease, immunoglobulin was given for 10 days and proven to supress the inflammation.

Limitations

An echocardiography was not performed due to the unavailability of mobile echocardiograpy in our centre giving a limitations in reporting the valvular & myocardial damage that may cause from the myocarditis or myocardial injury.

Conclusions

Cardiac injury may develop among patients hospitalized with COVID-19, and it is associated with a higher risk of in-hospital mortality. Although the exact mechanism of cardiac injury needs to be further explored, the findings presented in this case highlight the proper and early diagnostic, also prompt treatment in the early phase of the disease can prevent further damage, although definite therapy is not yet conclusive. Further study is needed to overcome and minimize cardiac complication of COVID-19.

References

1. WHO. Novel coronavirus – China. Jan 12, 2020. *http://www.who.* int/csr/don/12-january-2020-novel-coronavirus-china/en/ (accessed Jan 19, 2020).
2. Zeng J, Liu Y. et al. First case of COVID-19 infection with Fulminant Myocarditis Complication : case report and insights. *www.preprints.org.* Published online March 11, 2020. doi:10.20944/preprints202003.0180.v1
4. HuangC, WangY, LiX, RenL, ZhaoJ, HuY, ZhangL, FanG, XuJ, GuX, Cheng Z, YuT, XiaJ, WeiY, WuW, XieX, YinW, LiH, LiuM, XiaoY, GaoH, GuoL, Xie J, Wang G, Jiang R, Gao Z, Jin Q, Wang J, Cao B. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet* 2020;395: 497–506.
3. Inciardi R, Lupi L, et al. Cardiac Involvement in a Patient With Coronavirus Disease 2019 (COVID-19). *JAMA Cardiol*. Published online March 27, 2020. doi:10.1001/jamacardio.2020.1096
5. Liu P, Blet A, et al. The Science Underlying COVID-19: Implications for the Cardiovascular System. *Circulation AHA*. Published online April 16, 2020. Doi :10.1161/CIRCULATIONAHA.120.047549
6. Mehta P, McAuley D, et al. COVID-19: consider cytokine storm syndromes and immunosuppression. Lancet. Published online March 13, 2020 https://doi.org/10.1016/ S0140-6736(20)30628-0
7. Oudit GY, Kassiri Z, Jiang C, Liu PP, Poutanen SM, Penninger JM et al. SARS-coronavirus modulation of myocardial ACE2 expression and inflammation in patients with SARS. *Eur J Clin Invest.* 2009;39(7):618-25. doi:10.1111/j.1365-2362.2009.02153.x.
8. XuZ, ShiL, WangY, etal. Pathological findings of COVID-19 associated with acute respiratory distress syndrome. *Lancet Respir Med*. Published online February 18, 2020. doi:10.1016/S2213-2600 (20)30076-X
9. Channappanavar R, Perlman S. Pathogenic human coronavirus infections: causes and consequences of cytokine storm and immunopathology. *Semin Immunopathol.* 2017;39(5):529- 39. doi:10.1007/s00281-017-0629-x.
10. Luo P, Liu Y,etal, Tocilizumab treatment in COVID-19: A single centre experience. *J Med Virol*. 2020;1–5. DOI: 10.1002/jmv.25801
11. Cao W, Liu X, etal. High-Dose Intravenous Immunoglobulin as a Therapeutic Option for Deteriorating Patients With Coronavirus Disease 2019. *Open Forum Infectious Disease* 2020. Doi:10.1093/ofid/ofaa102