

Coinfection between SARS-CoV-2 and HIV with a low CD4+ T-cells count

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SUMMARY

Coronavirus Disease 2019 (COVID-19) is an acute respiratory infectious disease caused by the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) infection that started in Wuhan, China in December 2019 and has spread rapidly worldwide. It's critical to take extra precautions if a person has chronic illnesses (comorbidities), such as human immunodeficiency (HIV) infection. Concerns about people living with HIV (PLHIV) having a higher risk of serious COVID-19 disease may be based on the assumption that PLHIV are more likely to be immunocompromised. On the other hand, limited information is available in such people about the characteristics of co-infection between SARS-CoV-2 and Human Immunodeficiency Virus (HIV) who are at greater risk than the general population. Our findings, is of a 32 year old patient who came to Emergency Unit of Wangaya Hospital, Medical Faculty, Udayana University in Denpasar, Bali with complaint of fever, dry cough, and shortness of breath since prior 3 days and had also the past history prolonged fever, weight loss more than 10% 4 weeks. Diagnosis of COVID-19 was confirmed by nasopharyngeal swab sample was used for RT-PCR assay and PITC to confirm HIV infection. He had prolonged hospitalized and discharge after 18 days.

INTRODUCTION

WHO has declared that COVID-19 as a global pandemic and it became an of international concern.¹ Increasing age, hypertension, diabetes are risk factors causing worse COVID-19 outcomes. It is unclear that co-infection SARS-CoV-2 and HIV is at greater risk than in the general population.² COVID-19 is an acute infectious respiratory disease that is caused by a novel coronavirus. COVID-19 has a 2 to 14 day incubation period, and the principal pathways of transmission are respiratory droplets and close person-to-person contact (within 1 meter). Transmission can also happen if a person comes in contact with an infected surface or object, such as a pets.³ Fever, cough, shortness of breath, pneumonia, and other respiratory tract abnormalities are the most common symptoms. COVID-19 is diagnosed using a reverse-transcription polymerase chain reaction (RT-PCR) test from pharyngeal swabs and a chest X-ray to identify lesions.^{1,2}

The concern about PLHIV having a higher risk of severe COVID-19 disease stems from the assumption that PLHIV are more likely to be immunocompromised. HIV infection causes abnormal humoral and T-cell-mediated immune responses,

increasing susceptibility to a variety of opportunistic infections.³

PLHIV have a low CD4 cell count, advanced illness, a high viral load, or who are not on antiretroviral therapy (ART) should exercise extra caution. Many PLHIV may develop chronic conditions associated with severe COVID-19 disease as they live longer with ART.⁴

CASE REPORT

We present the case of a 32 year old male patient with COVID-19 and HIV co-infection, with longer hospitalization. He was living in Denpasar, Bali, Indonesia, came to Emergency Unit of Wangaya Hospital, Medical Faculty, Udayana University in Denpasar, Bali on November 3rd, 2020 (day 1) with complaint of fever, dry cough, and shortness of breath since prior 3 days. He had contact with a COVID-19 patient. He was fully alert, Chest X-Ray (CXR) showed bilateral infiltrates in the lungs (Figure 1). On the nasopharyngeal swab sample, RT-PCR assay was confirmed of COVID-19.

He also had a past history with prolonged fever (fever more than a month), weight loss more than 10% in 4 weeks (62 kg to 52 kg). Based on the clinical manifestation and his condition the provider initiative testing and counseling (PITC) was performed. Finally the patient was confirmed with HIV infection.

The diagnosis was SARS-CoV-2 pneumonia (COVID-19), HIV co-infection and hypoalbuminemia. The therapy was antiviral favipiravir loading dose 1,600 mg BID on day 1, followed by 600 mg BID, for 5 days (1 to 5 day) and 750 mg levofloxacin drip once daily, azithromycin 500 mg once /day orally, ascorbic acid 600 mg BID 4 and high calorie protein diet. The patient progress note is shown in Table I.

On 18-day, November 20th, 2020 (>2 weeks hospitalization), he was discharged and carried out isolation for 14 days from his community.

DISCUSSION

This patient was hospitalized with complaints of fever, dry cough, and shortness of breath for 3 days. He had contact with a COVID-19 patient. He was fully alert, Chest X-Ray (CXR) showed bilateral infiltrates in the lungs (Figure 1). On

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Table I: The progress note

Date	11. 3	11. 4	11. 9	11. 12	11. 16	11. 20
Day of admission	1	2	7	10	14	18
Fever (°C)	38.40C	38.20C	36.70C	37.30C	36.60C	36.40C
Shortness of breath	+	+	±	±	±	-
Respiratory rate (times/minute)	30	28	26	24	22	20
Blood pressure (mmHg)	110/70	110/70	110/70	110/70	115/70	115/70
Pulse rate(times/minute)	96	96	92	92	92	88
SPO2 (%)	93%	94%	94%	95%	96%	98%
WBC (10 ³ /μL)	2.61			5.02	4.84	-
Neutrophil (10 ³ /μL)	7.88			6.94	6.80	
Lymphocyte (10 ³ /μL)	0.81			1.22	1.39	
NLR	9.73			5.68	4.89	
ALT (U/L)	29					
AST (U/L)	35					
Albumin (g/dL)	2.9				3.5	
Urea (mg/dL)	32					
Creatinine serum (mg/dL)	1.0					
Blood sugar (mg/dL)	134					
Sodium (mmol/L)	135					
Potassium (mmol/L)	4.1					
Chlorida (mmol/L)	110					
D-Dimer (ng/mL)	491.0					
CXR	Bilateral infiltrates (Pneumonia)			The alleviation		
of pulmonary infiltrates	Non Reactive					
SARS-CoV-2 IgM	Non Reactive					
SARS-CoV-2 IgG						
Rapid test (Serology anti HIV)	Reactive					
RT-PCR	Positive			Positive	Negative	
CD4 T-Cell count (Cells/μL)	28					

SPO₂, Oxygen saturation; WBC, White Blood Cell; NLR, Neutrophil Lymphocyte Ratio

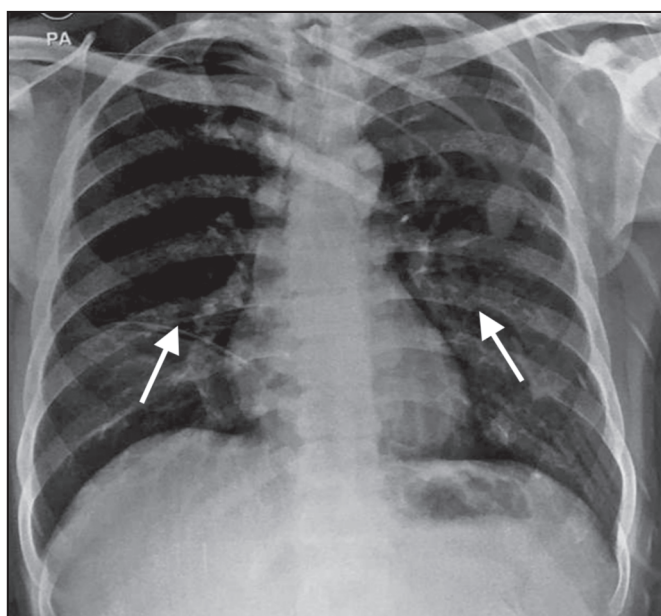


Fig. 1: Chest X-ray showed bilateral infiltrates.

the nasopharyngeal swab sample, RT-PCR assay was confirmed of COVID-19. He had the past history with prolonged fever (fever more than a month), weight loss more than 10% in 4 weeks (62 kg to 52 kg). Based on this condition the provider initiative testing and counseling (PITC) was

performed. Finally the patient was confirmed with HIV infection.

COVID-19 clinical characteristic are fever, shortness of breath, dry cough, myalgia, normal / decreased leukocyte counts, radiographic evidence of pneumonia. Clinical course of COVID-19 among HIV infected patients are still unclear. An increased of COVID-19 risk, due to HIV related immunosuppression.^{5,6}

In this patient, SARS-CoV-2 IgM and SARS-CoV-2 IgG were non-reactive, HIV antibody was reactive. IgM is widely known to provide the first line of defense during viral infection prior to IgG and it has been documented after SARS-CoV-2 infection. IgM antibodies can be identified in the blood after 3-6 days and IgG after 8 days.^{7,8} A significant explanation for the non-reactive IgM and IgG outcomes is the disparity in individual immune responses to antibody production.² Co-infection Covid-19 and HIV, which HIV had destroyed the immune system and the specific antibody reactions were compromised. In patients with COVID-19, total number of NK-cells, T-cells and B-cells, significantly decreased. The SARS-CoV-2 can damage T-lymphocytes in particular, and the immune system is compromised. On the chronic phase of untreated HIV (HIV ARV naïve), immune activation and reduction of CD4 lymphocyte or low CD4 cells count occurs. The neutrophil to lymphocyte ratio (NLR) calculated by dividing absolute neutrophil count and absolute lymphocyte count, having an important value in

detecting the inflammatory status of COVID-19 patients.⁶ Lymphopenia on admission in patients with COVID-19 is associated with poor outcome. A low serum albumin level can potentially lead to early recognition of severe disease.⁷

We found in this patient that the laboratory results were leukocyte (in lower levels) 2.61×10^3 / μ L, neutrophilia (increased of neutrophil levels) 7.88×10^3 / μ L, lymphopenia (decreased of lymphocyte levels) 0.81×10^3 / μ L, increased of neutrophil to lymphocyte ratio (NLR was 9.73), and high level of blood sugar 134 mg/dL. There were no abnormalities of renal, liver function test, and electrolyte (Urea was 32 mg/dL, creatinine serum was 1.0 mg/dL, ALT was 29 U/L, AST was 35 U/L, Sodium was 135 mmol/L, Potassium was 4.1 mmol/L, Chloride was 110 mmol/L). D-Dimer was 491.0 ng/mL. Decreased of albumin serum (hypoalbuminemia / a low albumin serum level) was 2.9 g/dL. Oxygen saturation (SpO₂) was 93%. Anti SARS-CoV-2 (SARS-CoV-2 IgG was non-reactive, SARS-CoV-2 IgM was non-reactive), HIV antibody was reactive. Chest X-Ray showed bilateral infiltrates in the lungs and heart in the normal limits.

Finally, the working diagnosis was pneumonia caused by SARS-CoV-2 infection, HIV infection ARV naïve and hypoalbuminemia.

Symptomatic and antiviral medications are the primary empirical therapies immediately at the onset of symptoms, including antibiotic, nutrient supplements, and oxygen therapy.^{9,10} Therapy given for this patient were for symptoms, antibiotic and antiviral drugs. Hypoalbuminemia were given albumin 20% (100 cc) 7 drops/min once daily until albumin serum was ≥ 3.5 g/dl and high calorie protein diet.

CONCLUSION

Detail and chronologically clinical history exploration may be essential to be aware in the case of COVID-19 and HIV co-infection and it may relate to the prolonged hospitalization. Symptomatic, antiviral and other supportive are the primary empirical therapies should be given immediately at the symptoms onset.

CONSENT FOR PUBLICATION

Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

COMPETING INTERESTS

No conflict of interest.

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