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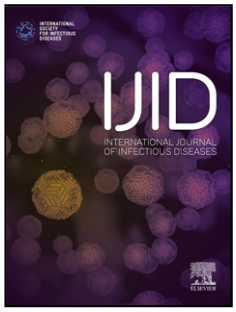

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Case Report: One Case of Coronavirus Desease 2019(COVID-19) in Patient Co-nfected by HIV With a Low CD4+ T Cell Count

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Highlights

● Patient infected by SARS-Cov-2 and HIV tend to have a longer course of disease and slower generation of specific antibody.

● For suspected case of COVID-19, Nucleic acid detection, gene sequencing and antibody detection can confirm the diagnosis respectively.

● SARS-Cov-2 may damage lymphocytes, especially T lymphocytes, and the immune system was impaired during the period of disease.

Abstract

The ongoing outbreak of COVID-19 that began in Wuhan, China has become an emergency of international concern When thousands of peolple were infected around the world.We report a case infected by SARS-Cov-2 and HIV simultaneously,which showed a longer course of disease and slower generation of specific antibody. This case highlights the coinfection of SARS-Cov-2 and HIV may impaire the immune system worse.

Keywords

COVID-19, SARS-Cov-2, HIV, antibody

Introduction

Since December 2019, an outbreak of coronavirus disease, officially named by the World Health Organization as COVID-19, appeared in

Wuhan, Hubei Province, China. Patients presented with severe viral pneumonia and respiratory illness. Lymphopenia has been considered as a poor prognostic factor for severe acute respiratory syndrome(SARS)[1] as well as in COVID-19[2]. Here, we report clinical findings in a patient confirmed with COVID-19, who was also co-infected by Human immunodeficiency virus (HIV) .

Case presentation

Here we report a patient infected by SARS-Cov-2 , who had a relatively long course of disease with unstable state. Then eight markers of infectious diseases was checked and the result showed that abtibodies to HIV and syphilis were positive .Then the patient was transferred to specialty hospital for further treatment on March 8. In the specialty hospital, the CD4 cell count was 34/ul, CD8 cell count was 737/ul and CD4/CD8 was 0.05. The dectection of cryptococcus antigen in serum was negative and The patient was then given anti-HIV treatment .

On February 11, 2020, a 37-year-old man was presented to Wuhan Huo Shen Shan hoapital, with a history of fever, dry cough and chest pain since January 10, 2020. The chest CT of this patient on February 8 showed multiple infiltration in both lungs, consistent with viral infections . But the RT-PCR amplification of SARS-Cov-2 virus nucleic acid from a nasopharyngeal swab showed negative result. He denied any

other diseases before this onset. The initial physical examination revealed a body temperature(BT) of 38.8℃,oxygen saturation(SPO2)85-90% under ambient air, Respiratory rate of 40 breath/min, blood pressure of 145/93 mmHg, pulse of 119 bpm. The laboratory results reflected normal lymphocyteS, normal procalcitonin (PCT 0.04ng/ml) and elevated C-reactive protein (CRP, 96.5mg/L), a-hydroxybutyrate dehydrogenase (a-HBDH, 318IU/L), glutamyltrans -peptidase(GGT,136IU/L).

The RT-PCR amplification of SARS-Cov-2 virus nucleic acid from a nasopharyngeal swab was tested for four times after admission. We had negative results except The swab of February 20, which showed ORF1ab gene positive, but N gene negative. The serum test of IgG and IgM of SARS-Cov-2 on March 5 and 7 was also negative. After the transportation to specialty hospital, IgM of SARS-Cov-2 was detected in serum, which confirmed the SARS-Cov-2 infection.

After admission to our hospital ,The patient was treated with high flow oxygen(15L/min) and arbidol (0.2g, Tid) and his vital sign remained stable for the first three days, Apart from dyspnea and chest pain(Fig. 1). On February 14, He got a high fever with 39.4℃,accompanied with dyspnea and palpitation. A short term corticosteroid therapy was given: methylprednisone 40mg/d × 5d. Moxifloxacin was also given for anti-bacterial therapy. The body temperature turned normal. But the patient still suffered from dyspnea, palpitation and chest pain. He still

needed high flow oxygen(10L/min) with mask .Till February 29, the second chest CT showed inflammation absorption compared to the previous one. The lymphocytes steadily dropped. On March 3, IL-6 in serum was 9.87pg/ml. sulbactam/cefoperazone(sulperazone) was added for anti- bacterial therapy. Human serum albumin , thymosin and ulinastatin were also used. Tocilizumab was given to fight inflammation storm on March 5, The IL-6 in serum rised to141.4 pg/ml on March 7.

Discussion

The SARS-Cov-2 virus nucleic acid RT-PCR test from nasopharyngeal swabs has become the standard method for diagnosis of SARS-Cov-2 infection. But these test kits have many limitations. Because there are so many interference factors during the collection, preservation and transportation of the swab specimen and high false negative rates had been reported. According to the seventh edition of clinical practice guideline for COVID-19 in China, Nucleic acid detection, gene sequencing and antibody detection can confirm the diagnosis respectively. In this case, the patient had a history of fever, lived in Wuhan and had CT findings of viral pneumonia, which was a suspected case. According to the laboratory test results, the patient had lower lymphocytes and elevated CRP levels, consistent with viral infection. On

this base, COVID-19 was diagnosed by positive results of ORF1ab gene of SARS-Cov-2 from nasopharyngeal swab and specific antibody in serum.

COVID-19 is caused by a novel type of coronavirus SARS-Cov-2. People are generally susceptible to SARS-Cov-2 infection, especially the elderly patients and those with underlying diseases[2]. The median time from onset of symptoms to first hospital admission was 7 days, to shortness of breath was 8 days, to ARDS was 9days, to mechanical ventilation was 10.5 days, and to ICU admission was 10.5 days. [3]

The patient described here were admitted to our hospital because of fever which lasting nearly one month and typical changes of viral pneumonia in lung CT imaging. The prominent complaint was dyspnea, especially after activation. After systemic treatment from February 11to March 8, the hypoxemia had not got better. For SARS-Cov-2 infection, two months was a too long course. The co-infection of HIV gave a reasonable answer.

It is widely accepted that IgM provide the first line of defense during viral infection, prior to the generation of IgG. It was reported that after SRAS infection, IgM antibody could be detected in patient blood after 3-6 days and IgG could be detected after 8 days[4].From the limited data of COVID-19 patients from Wuhan Red Cross Hospital, , 94.83% had

both IgM and IgG positive test lines, and 1.72%, 3.45% had only IgM or only IgG positive lines respectively. The test time was at day 8 to day 33 after clinical symptoms appeared. The difference in individual immune response with antibody production may be an important reason for the negative result of IgM and IgG[5].

For this case, 2 months after infection symptoms appeared, IgM of SARS-Cov-2 was detected in serum. The co-infection of HIV may play an important role. HIV destroy the immune system and specific antibody responses were delayed or even vanished, which consequently resulted in a too long course of disease. Further studies and information collection are needed for this.

The study of Qin showed, The total number of B cells, T cells, and NK cells significantly decreased in patients with COVID-19, and more evident in the severe cases compared to the non-severe group. The author suggested that SARS-Cov-2 might damage lymphocytes, especially T lymphocytes, and the immune system was impaired during the period of disease[2].

During the chronic phase of untreated HIV, generalized immune activation and systemic CD4 lymphocyte depletion occurs, and remaining T cells may mount abnormal responses to antigens. Accompanying B-cell dysfunction results in abnormal polyclonal activation and lack of specific

antibody responses.

In view of the high amount of cytokines induced by SARS-CoV, MERS- CoV, and 2019-n CoV infections, corticosteroids were used frequently in the treatment of patients with severe illness, for possible benefit by reducing inflammatory-induced lung injury. On the other hand, corticosteroids may delay viral clearance[3]. In this case, corticosteroid therapy was used(methylprednisone 200mg totally) accompanied with arbidol for anti-virus therapy.The body temperature turned normal. we also used Tocilizumab one time to fight inflammation storm, which did not show the reduction of IL-6 in serum.

In conclusion, we report the clinical features of a patient infected by SARS-Cov-2 and HIV. The case appeared to be a long course of disease for more than 2 months. And until the later period of the course the IgM in serum could be detected, which may due to the destroy of the immune response by the two viruses cooperatively.

Conflict of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Funding Sources

The research received no external funding

Ethics approval and consent to participate

Not aplicable

Conflict of interest statement

We declare that we have no financial and personal relationships with other people or organizations that can inappropriately influence our work, there is no professional or other personal interest of any nature or kind in any product, service and/or company that could be construed as influencing the position presented in, or the review of, the manuscript entitled.

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Date	02.12	02.17	02.19	02.21	02.25	02.26	02.29	03.02
Day of admission	2	7	9	11	15	16	19	21
Fever(℃)	38.7	36.6	36.8	36.9	36.6	36.7	36.7	37.1
SPO2(%)	96	98	97	95	96	97	98	96
O2 support(L/min)	15	15	15	10	8	8	8	8
Mask	-	-	-	+	+	+	+	+
White cell(10^9/L)	4.2	3.2		4.6	3.8	4.5		3.3
neutrophils(10^9/L)	1.97	2.18		3.16	2.37	2.7		2.23
lymphocyte(10^9/L)	1.55	0.6		0.91	0.84	1.3		0.56
CRP	96.51	42.7		26.1	11.14	8.89		11.65
ALB	33.2			28.7		28.8		26
AST	35.9			33.7		53.6		52.6
ALT	39			91		128		132
GGT	136			134		111		113
LDH	423		367	343		358		357
LDBH	318		316	277		286		272
RT-PCR			±		-		-	-

Figure1 Vital sign and examination by the day of hospitalization,February 11 to March 8

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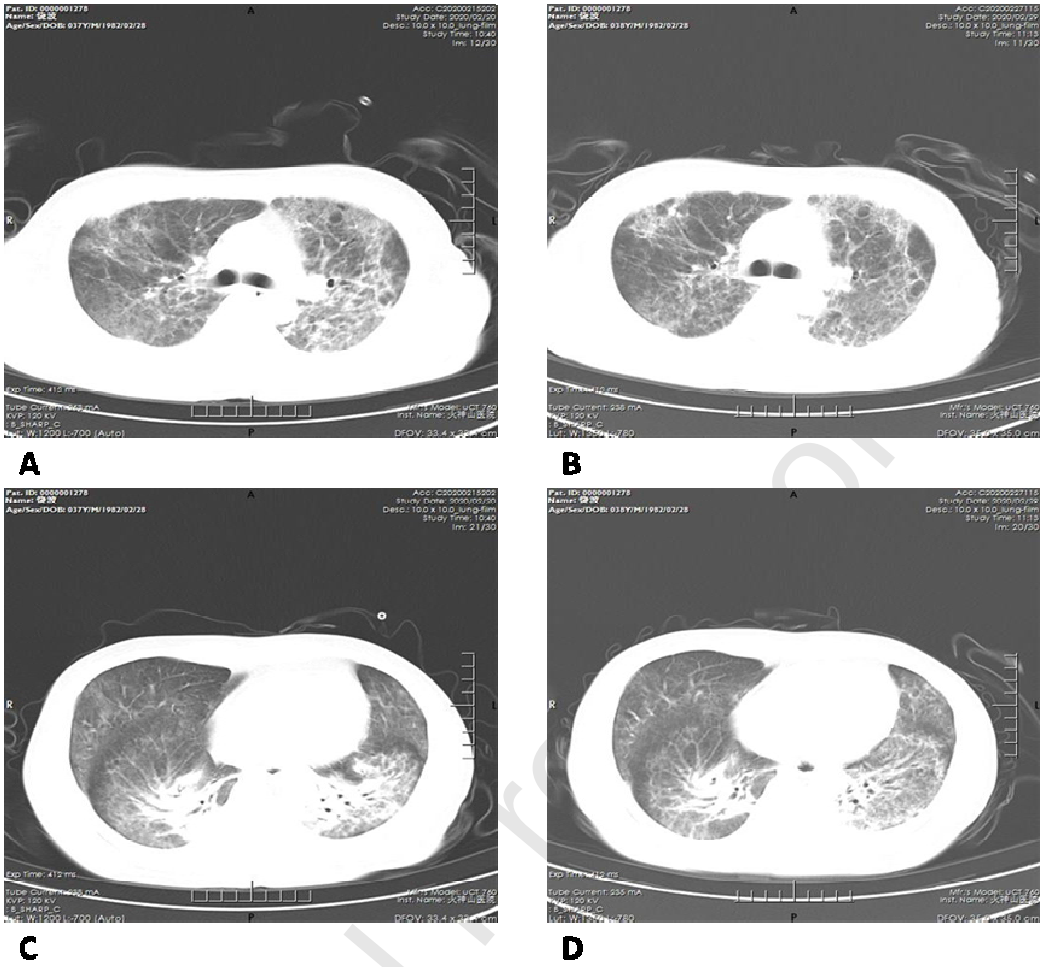

Fig.2. chest CT imaging change

The first CT scan(A,C) showed bilateral diffuse ground glass attenuation with some patchy consolidations. Another CT acquired(B,D) after 9 days of treatment showed some improvement.

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