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Cytomegalovirus infection after COVID-19 in a kidney transplant patient, a case report

Mohammad Alizadeh[1], Azamolmolouk Elsagh[2*], Mana Mohamadi Afrakoti[3], Zohreh Khavari[4]

[1]Department of Infectious Diseases and Tropical Medicine, School of Medicine, Alborz University of Medical Sciences, Karaj, Iran
[2]Faculty of Nursing and Emergency Medicine, Alborz University of Medical Sciences, Karaj, Iran
[3]Nephrologist, School of Medicine, Alborz University of Medical Sciences, Karaj, Iran
[4]Faculty of Meybod Nursing School, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

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ABSTRACT

COVID-19, with its complications and co-infections is the most important pandemic, which has placed great strain on even the most developed health care systems, especially on the kidney transplant patients. We present a case of cytomegalovirus (CMV) reactivation after remission of COVID-19 in a kidney transplant patient, admitted to the emergency department. Fever, dyspnea, weakness and tachypnea are the most common symptoms of COVID-19, which can mislead physicians to make inappropriate decisions. We concluded that CMV can potentially increase the mortality risk of kidney transplant recipients (KTRs).

Case Report

Implication for health policy/practice/research/medical education:
This case study can help physicians for consideration of the possibility of cytomegalovirus (CMV) in critically ill patients whose clinical condition is deteriorating.

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Introduction

Coronavirus is a single RNA virus that has the ability to mutate and recombinant quickly. This new coronavirus illness, commonly known as coronavirus disease 2019 (COVID-19), is extremely transmitted and has spread fast all over the world (1, 2).

Coronavirus disease infected 380 321 615 people until February 2, 2022, resulting in 5 680 741 deaths (3). Bacterial and fungal super infections are important complications of COVID-19 and may be associated with the worst outcomes in patients (4).

Cytomegalovirus is the most common viral infection among patients with kidney failure, especially kidney transplant recipients (KTRs) (5). Studies show that COVID-19 can induce cytokines to increase creatine kinase (CK), which in turn, elevates serum creatinine (Cr) and blood urea nitrogen (BUN), particularly in KTRs (6,7).

So far, some cases of co-infection with COVID-19 and cytomegalovirus (CMV) have been reported (8,9). We report a complicated kidney transplant patient with CMV infection, after recovery of COVID-19 infection.

Case Presentation

A 45-year-old female presents to the emergency department (ED) with sustained dyspnea and tachypnea (respiratory rate= 38/min), tachycardia (heart rate = 156/min), fever (T = 38.7°C) and inferior chest pain within the last 10 days prior to hospitalization. The medical history of the patient consisted of COVID-19 within the past 20 days and being discharged after 15 days of treatment, while the polymerase chain reaction (PCR) test was negative.

The patient had a history of uncomplicated well-controlled type 2 diabetes and hypertension, and a kidney transplantation three years before. There was no evidence of COVID-19 pattern in the current chest

***Corresponding author**: Azamolmolouk Elsagh, Email: a_elsagh@abzums.ac.ir

computerized tomography (CT) scan that time, while her clinical examination revealed hypoxemia ($SatO_2$; 86% with 4 L/min of oxygen via nasal cannula). Chest tube was embedded due to the air fluid level, seen in her lungs. By consultation of a cardiologist, metoprolol reduced tachycardia (heart rate = 115/min), but it was not resolved. Laboratory assessment revealed a lower hemoglobin (7.6 g/dL). Two units of packed cell were administered for her. Despite of all these treatments, by day 4 of hospitalization, severe acute respiratory distress syndrome (ARDS) developed, that was being managed with dexamethasone, anticoagulants and antibiotics. In spite of all these treatments, the general condition of our patient, was worsened after four days of hospitalization. There was no clinical evidence to support CMV, however; laboratory tests of day 7 of hospitalization showed CMV viral loading over than 1 million UI/mL. She had no history of CMV in the past. Therefore, ganciclovir was then started and 72 hours later tachycardia and hypoxemia were treated and laboratory test results improved, permitting regular diet to be administered to the patient. The presented case finally recovered and was discharged from hospital after a complete treatment.

Discussion

We present a case report of CMV reactivation after remission of COVID-19 in a kidney transplantation patient, admitted to the emergency department. In fact, dyspnea, fever and tachypnea are all the most common symptoms of COVID-19 (10-12), since our presented case showed all of them, despite of her negative PCR test. Based on Gu et al investigations, PCR testing becomes positive and remains so for several days after sputum expulsion had become negative in 82% of the patients (13). In addition, COVID-19 causes radiological changes in the lungs, such as ground-glass opacity, thickened bronchial wall, and pleural effusion (14). Our presented case suffered from pleural effusion. Therefore, these symptoms led us to conclude that we had encountered with a prolonged COVID-19.

There were challenges that we faced while managing our case. Especially, COVID-19 treatment. Control in patients with kidney transplantation is very challenging due to their chronic immunosuppression and sensitivity to a diversity of viral pathogens (15). There are concerns about the risk of increased severity of co-infections (9). It has been well acknowledged that critical illness itself can promote immune suppression, even in the absence of known immune deficiency states. This is due to an underlying complex immune system activation, composed of both pro- and anti-inflammatory responses (16). Likewise, co-infection can obviously repress the immune system of the host, increase antibacterial therapy intolerance and can be harmful to the prognosis of the disease (17). Furthermore, administration of glucocorticoid is associated with an increased risk of CMV in immunocompetent hosts (18). Osawa et al reported a patient in a critical condition as a known risk factor for CMV reactivation because of receiving glucocorticoid for ARDS and refractory shock. They concluded that use of glucocorticoid is associated with an increased risk of CMV in immunocompetent hosts (19). Meanwhile, an increasing number of studies have reported a high number of co-infections such as viral, fungal and bacterial co-infections (20-23). There are few case descriptions of COVID-19 and CMV coinfections. In this regard, Moss et al, suggested that any such an association might be reflected either by the extent of SARS-CoV-2 viral replication or can show the quality of immune response(24). The coinfection of CMV and SARS-CoV-2 in KTRs was reported by Molaei et al for the first time. They found that this coinfection could significantly increase the disease severity and mortality rate in KTRs patients (7). Consequently, this situation is an important condition and should be considered in KTRs patients' treatment procedure. Furthermore, Zhu X et al reported a high co-infection rate and pathogen species in patients within 0-4 days after onset (17). Most of studies suggested that CMV may occur parallel with COVID-19 in KTRs patients. We presented CMV after remission of COVID-19. This is a very rare situation because all studies reported CMV co-infection (8,9,23). In fact, the role and the rate of CMV reactivation in SARS-CoV-2 patients are unclear (17,18). Meanwhile, CMV testing is necessary in patients without the aforementioned risk factors. Furthermore, a secondary influence, exerted by the acute inflammation leading to enhanced CMV reactivation, must be considered too (9). Further scientific investigation is necessary to establish this relationship and its clinical significance.

Conclusion

We report successful management of invasive CMV in a patient, survived 14 days after COVID-19, with atypical symptoms. The role of SARS-CoV-2 infection on CMV reactivation remains to be unraveled. Multiple confounding factors usually associated with immunosuppressive patients like KTRs patients, presence of critical illness itself and other underlying immunosuppressive treatments will certainly challenge further research. Physicians should always consider the possibility of CMV in critically ill patients whose clinical condition is deteriorating.

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Authors' contribution

AAE conceptualized and managed the project. MA and MMA were the physicians of the patient and completed

data and participated in laboratory experiments, analysis, and interpretation of the results. MA treated and followed the patient and revisited the case. AAE revisited the case and wrote the manuscript. All authors participated in preparing the final draft of the manuscript, and they revised the manuscript and critically evaluated the intellectual contents. All authors have read and approved the content of the manuscript and confirmed the accuracy or integrity of any part of the work. AAE reviewed and edited the final manuscript and read and signed the final paper. The authors completely observed the ethical issues including data fabrication, distortion, plagiarism and redundancy.

Conflicts of interest

The authors have declared no conflict of interests.

Ethical issues

This case report was conducted in accordance with the World Medical Association Declaration of Helsinki. The patient has given us a written informed consent for publication as a case report. Ethical issues (including plagiarism, data fabrication, double publication) have been completely observed by the authors.

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References

1. Hui DS, I Azhar E, Madani TA, Ntoumi F, Kock R, Dar O, et al. The continuing 2019-nCoV epidemic threat of novel coronaviruses to global health - The latest 2019 novel coronavirus outbreak in Wuhan, China. Int J Infect Dis. 2020; 91:264-266. doi: 10.1016/j.ijid.2020.01.009.
2. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet. 2020; 395:497-506. doi: 10.1016/S0140-6736(20)30183-5.
3. World Health Organization. Coronavirus Disease (COVI19) pandemic. https://www.who.int/emergencies/diseases/ novel-coronavirus-2019. 2021. Accessed February 19.
4. Garcia-Vidal C, Sanjuan G, Moreno-García E, Puerta-Alcalde P, Garcia-Pouton N, Chumbita M, et al. COVID-19 Researchers Group. Incidence of co-infections and superinfections in hospitalized patients with COVID-19: a retrospective cohort study. Clin Microbiol Infect. 2021; 27:83-88. doi: 10.1016/j.cmi.2020.07.041.
5. Banerjee D, Popoola J, Shah S, Ster IC, Quan V, Phanish M. COVID-19 infection in kidney transplant recipients. Kidney Int. 2020;97:1076-82. doi: 10.1016/j.kint.2020.03.018.
6. Lippi G, Plebani M, Henry BM. Thrombocytopenia is associated with severe coronavirus disease 2019 (COVID-19) infections: A meta-analysis. Clin Chim Acta. 2020; 506:145-148. doi: 10.1016/j.cca.2020.03.022.
7. Molaei H, Khedmat L, Nemati E, Rostami Z, Saadat SH. Iranian kidney transplant recipients with COVID-19 infection: Clinical outcomes and cytomegalovirus coinfection. Transpl Infect Dis. 2021; 23:e13455. doi: 10.1111/tid.13455.
8. Billah M, Santeusanio A, Delaney V, Cravedi P, Farouk SS. A catabolic state in a kidney transplant recipient with COVID-19. Transpl Int. 2020;33:1140-1141. doi: 10.1111/tri.13635.
9. Amaral PH, Ferreira BM, Roll S, Neves PD, Pivetta LG, Mohrbacher S, et al. COVID-19 and Cytomegalovirus Co-infection: A Challenging Case of a Critically Ill Patient with Gastrointestinal Symptoms. Eur J Case Rep Intern Med. 2020;7:001911. doi: 10.12890/2020_001911.
10. Ozaras R, Cirpin R, Duran A, Duman H, Arslan O, Bakcan Y, et al. Influenza and COVID-19 coinfection: Report of six cases and review of the literature. J Med Virol. 2020; 92:2657-65. doi: 10.1002/jmv.26125.
11. Langford BJ, So M, Raybardhan S, Leung V, Westwood D, MacFadden DR, et al. Bacterial co-infection and secondary infection in patients with COVID-19: a living rapid review and meta-analysis. Clin Microbiol Infect. 2020;26:1622-1629. doi: 10.1016/j.cmi.2020.07.016.
12. Lansbury L, Lim B, Baskaran V, Lim WS. Co-infections in people with COVID-19: a systematic review and meta-analysis. J Infect. 2020;81:266-275. doi: 10.1016/j.jinf.2020.05.046.
13. Davis B, Rothrock AN, Swetland S, Andris H, Davis P, Rothrock SG. Viral and atypical respiratory co-infections in COVID-19: a systematic review and meta-analysis. J Am Coll Emerg Physicians Open. 2020;1:533–48. doi: 10.1002/emp2.12128.
14. Gu J, Han B, Wang J. COVID-19: Gastrointestinal Manifestations and Potential Fecal-Oral Transmission. Gastroenterology. 2020;158:1518-9. doi: 10.1053/j.gastro.2020.02.054.
15. Omoush SA, Alzyoud JAM. The Prevalence and Impact of Coinfection and Superinfection on the Severity and Outcome of COVID-19 Infection: An Updated Literature Review. Pathogens. 2022;11:445. doi: 10.3390/pathogens11040445.
16. Chiche L, Forel JM, Roch A, Guervilly C, Pauly V, Allardet-Servent J, et al. Active cytomegalovirus infection is common in mechanically ventilated medical intensive care unit patients. Crit Care Med. 2009; 37:1850-7. doi: 10.1097/CCM.0b013e31819ffea6.
17. Zhu X, Ge Y, Wu T, Zhao K, Chen Y, Wu B, et al. Co-infection with respiratory pathogens among COVID-2019 cases. Virus Res. 2020; 285:198005. doi: 10.1016/j.virusres.2020.198005.
18. Moniz P, Brito S, Póvoa P. SARS-CoV-2 and Cytomegalovirus Co-Infections-A Case Series of Critically Ill Patients. J Clin Med. 2021;10:2792. doi: 10.3390/jcm10132792.
19. Osawa R, Singh N. Cytomegalovirus infection in critically ill patients: a systematic review. Crit Care. 2009;13:R68. doi: 10.1186/cc7875.
20. Fakhreddine AY, Frenette CT, Konijeti GG. A Practical Review of Cytomegalovirus in Gastroenterology and Hepatology. Gastroenterology Res Pract. 2019; 2019:6156581. doi: 10.1155/2019/6156581.
21. Li XX, Zhou XN. Co-infection of tuberculosis and parasitic diseases in humans: a systematic review. Parasite Vectors. 2013;6:79. doi: 10.1186/1756-3305-6-79.

22. Cheung KS, Hung IFN, Chan PPY, Lung KC, Tso E, Liu R, et al. Gastrointestinal Manifestations of SARS-CoV-2 Infection and Virus Load in Fecal Samples From a Hong Kong Cohort: Systematic Review and Meta-analysis. Gastroenterology. 2020;159:81-95. doi: 10.1053/j.gastro.2020.03.065.
23. Maillet F, Pourbaix A, le Pluart D, Sirmai L, Postolache SA, Couvelard A, et al. Cytomegalovirus proctitis as a complication of COVID-19 with immunosuppressive treatments. IDCases. 2021;24:e01111. doi: 10.1016/j.idcr.2021.e01111.
24. Guo L, Wei D, Zhang X, Wu Y, Li Q, Zhou M, et al. Clinical Features Predicting Mortality Risk in Patients With Viral Pneumonia: The MuLBSTA Score. Front Microbial. 2019; 10:2752. doi: 10.3389/fmicb.2019.02752. Erratum in: Front Microbial. 2020; 11:1304.
25. Moss P. "The ancient and the new": is there an interaction between cytomegalovirus and SARS-CoV-2 infection? Immune Ageing. 2020;17:14. doi: 10.1186/s12979-020-00185-x.