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LETTER TO THE EDITOR

WILEY

Reinfection with SARS-CoV-2 in a kidney transplant recipient

To Editor,

Reinfection with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was reported in a minority of cases after recovering from initial disease,[1,2] and immunosuppression, and comorbid diseases are considered as risk factors.[2] Possible mechanisms include the disappearance of protective antibodies to SARS-CoV-2 and re-exposure to new variants but delayed viral clearance should also be considered in the differential diagnosis.[3] We herein present a kidney transplant recipient who was admitted twice with the diagnosis of coronavirus disease 2019 (COVID-19).

A 34-year-old male was diagnosed with chronic glomerulonephritis 15 years ago, which progressed to end-stage kidney disease 12 years ago. He had a cadaveric donor transplant after a decade of hemodialysis, and his immunosuppressive regimen consisted of tacrolimus, everolimus, and prednisolone.

He was first diagnosed with real-time reverse transcription-polymerase chain reaction (RT-PCR) and confirmed COVID-19 in June 2020. Despite mild manifestations, he was hospitalized for 7 days for close follow-up, and he recovered fully.

He was evaluated again in December 2020 because of cough and fever, and his nasopharyngeal swab RT-PCR test was positive for SARS-CoV-2 with a Ct value of 26.7. Computed chest tomography showed bilateral infiltrates, his laboratory investigations revealed a lymphocyte count of 800/mm^3, D-dimer 408 μg/L, serum creatinine 176.84 μmol/L, lactate dehydrogenase 217 U/L, ferritin 676 mg/dl, and C-reactive protein 6 mg/L. After diagnosing reinfection with SARS-CoV-2, everolimus was discontinued, prednisolone dosage was increased to 10 mg, and favipiravir was started (1600 mg twice a day for 1 day, then 600 mg twice a day for 4 days). He was admitted to the hospital because of persistent fever on the 9th day after the initial symptoms, and repeated investigations showed a lymphocyte count of 600/mm^3, ferritin 1587 mg/dl, and C-reactive protein 77 mg/L. Steroid dosage was increased (methylprednisolone 10–30 mg for 10 days; intravenous), low-molecular-weight heparin and anakinra (200–300 mg/day subcutaneously adjusted according to the inflammatory findings for 8 days; subcutaneous) were added to the treatment with the diagnosis of COVID-19-related macrophage activation syndrome (Figure 1). His fever and inflammatory parameters resolved within days. He was discharged in good condition on the 10th day of hospitalization.

Reinfection with SARS-CoV-2 with variable clinical findings can be diagnosed more than 90 days after the initial infection in asymptomatic patients, or 45 to 89 days after detection of viral RNA in symptomatic patients.[1–4] But, persistent shedding of SARS-CoV-2 has also been reported.[4] In our case, the RT-PCR test was performed once in the first disease and three times in the re-infection, but cycle threshold measurement could not be obtained in all samples. For this reason, we could not show that there is a definite re-infection with this method. Also, we could not have a viral RNA sequence confirmation, 6 months interval, and fully asymptomatic period between two presentations supported the diagnosis of reinfection in our case. Unlike the initial disease with mild manifestations, findings of macrophage activation syndrome developed during the reinfection, which might be associated with higher viral load, type of variants, or trained immunity affecting monocyte and macrophage responses as well as suppressed B and cytotoxic T-cell responses. Further studies are warranted on the immune responses against SARS-CoV-2 to be able to clarify dynamics affecting reinfection susceptibility and variable disease course especially in patients with kidney transplant recipients who had a higher risk of severe disease and death.[5]

CONFLICT OF INTEREST

The authors declare that they do not have any conflict of interest.

AUTHOR CONTRIBUTIONS

Shirkhan Amikishiyev, Erol Demir, Ahmet Gul, and Aydin Turkmen designed the study. The experiments were carried out by Sarvan Aghamuradov, Nurana Garayeva, Ayse Serra Artan, and Erol Demir created the figure. The paper was drafted and revised by Shirkhan Amikishiyev, Erol Demir, Sarvan Aghamuradov, Nurana Garayeva, Ayse Serra Artan, Ahmet Gul, and Aydin Turkmen. All authors approved the final version of the manuscript.

ETHICS APPROVAL

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

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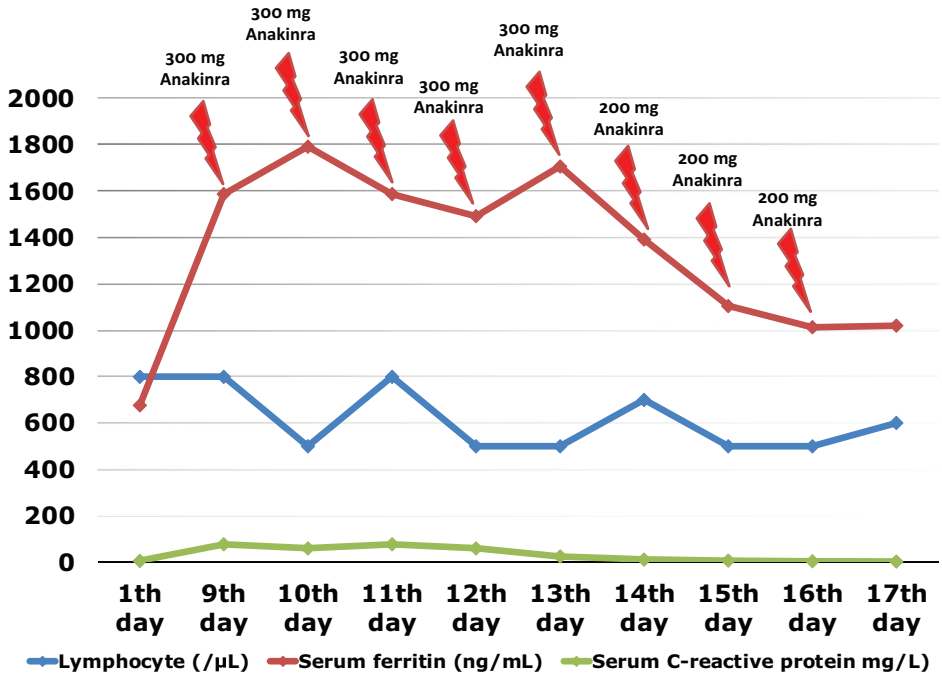

FIGURE 1 The course of the laboratory results during coronavirus disease 2019 (COVID-19) treatment

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REFERENCES

1. dos Santos LA, de Gois Filho PG, Silva AMF, et al. Recurrent COVID-19 including evidence of reinfection and enhanced severity in thirty Brazilian healthcare workers. *J Infect*. 2021;82:399-406. https://doi.org/10.1016/j.jinf.2021.01.020.
2. Seyed Alinaghi SA, Oliaei S, Kianzad S, et al. Reinfection risk of novel coronavirus (COVID-19): systematic review of current evidence. *World J Virol*. 2020;9(5):79-90. https://doi.org/10.5501/wjv.v9.i5.79.
3. European Centre for Disease Prevention and Control. Reinfection with SARS-CoV: considerations for public health response; 2020
4. Yahav D, Yelin D, Eckerle I, et al. Definitions for COVID-19 reinfection, relapse and PCR re-positivity. *Clin Microbiol Infect*. 2020;27(3):315-318. https://doi.org/10.1016/j.cmi.2020.11.028.
5. Caillard S, Chavarot N, Francois H, et al. Is COVID-19 infection more severe in kidney transplant recipients? *Am J Transplant*. 2021;21:1295-1303. https://doi.org/10.1111/ajt.16424.