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Case Report

A case of COVID-19 infection in a kidney transplant recipient after receiving the single dose of COVID-19 vaccination

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ABSTRACT

Introduction and importance: As immunocompromised individuals, kidney transplant recipients (KTR) were more prone to severe and prolonged COVID-19 infection.
Case presentation: A 52-year-old man with a history of two kidney transplants for polycystic kidney disease (PKD) was hospitalized due to COVID-19 illness after receiving the first dose of COVID-19 vaccination with Sputnik V. After being admitted to the hospital, the patient was given Remdesivir and oxygen therapy.
Clinical discussion: We reported a COVID-19 infection after the first dose of Sputnik V vaccination in an immunocompromised patient who did not follow the protocols after vaccination. Regardless of vaccination, he had been infected, but the vaccination saved him from severe infection despite his comorbidity.
Conclusion: To summarise, infection with COVID-19 should be considered after vaccinations, particularly the first dose, in immunocompromised patients such as KTR, and protocols for these patients should be strictly followed. It is worth mentioning that even a full dose of vaccination does not provide full protection from infection to anyone, including KTR.

1. Introduction

Patients with kidney disease are more likely to develop severe COVID-19 [1]. This risk is heightened in kidney transplant recipients, where the risk of death from SARS-CoV-2 infection is estimated to be as high as 25% [1,2]. Kidney transplant recipients may experience a variety of comorbidities and mortality risks [3]. A kidney transplant recipient is at increased risk of severe COVID-19 infection and hospitalization as an immunocompromised patient. This hospitalization may raise the chance of other comorbidities problems, such as urinary tract infection (UTI), despite lower immunity after COVID-19 infection, as a comorbidity of kidney transplant or hospital-acquired infections (HAI) [4,5]. According to studies, severe cases of COVID-19 still occur in vaccinated transplant recipients [6], demonstrating that the current standard COVID-19 vaccination approach is inadequately protecting them [2,6]. We present a kidney transplant patient with an episode of transplant rejection who had hospitalizations due to COVID-19 infection after receiving his first dose of COVID-19 vaccination, which is remarkable, according to the literature review. Our work has been reported in line with the SCARE 2020 criteria [7].

2. Case presentation

A 52-year-old Iranian man with a BMI of 26 was referred to Sina hospital's emergency department with shortness of breath and dyspnea. This case report is presented based on CARE guidelines. The patient signed the written informed consent form. For the second time, he was a known case of polycystic kidney disease (PKD)-related kidney transplantation. The patient was an ambulance driver who was highly vulnerable to infection. As a result, on March 9, 2021, the patient received the first Sputnik V vaccine as part of a group of health care workers. Following the first dose of the vaccine, the patient did not correctly adhere to health protocols. Twenty-four days after receiving the first dose of the vaccine, the patient developed weakness, lethargy, sore throat, and dry cough. Because he had received a dose of the vaccine within the first five days of the onset of symptoms, the patient had no reason to suspect COVID-19 infection. His symptoms began five days before he was admitted to the hospital. Symptoms included pleuritic chest pain, myalgia, sore throat, coughing, and diarrhea. He took immunosuppressive medications, including Prednisolone 5 mg daily, Cellcept three times a day, and Prograf 0.5 mg daily. The patient did not

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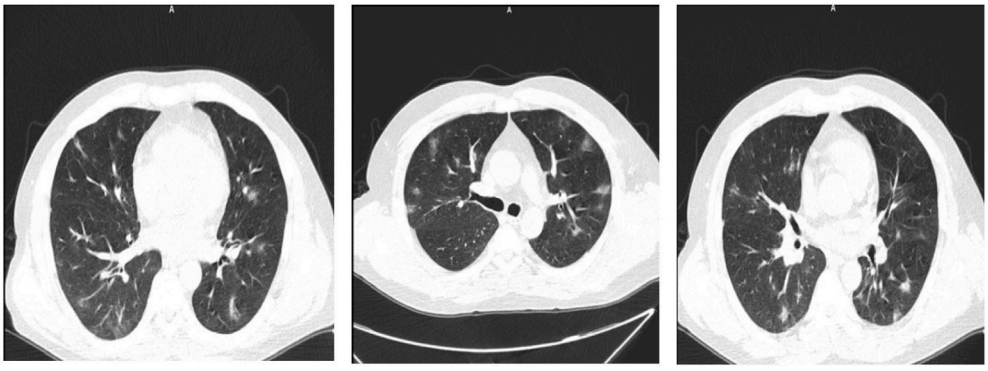

Fig. 1. The findings of the patient's pulmonary CT scans.

mention any remarkable family history. Following the continuation of the patient's symptoms, he came to the emergency room of Sina hospital, and his vital signs were reported as expected at the initial visit, except for blood oxygen saturation. His examination revealed no pathologic signs, except for his oxygen saturation, 90% without oxygen and 94% with oxygen. His COVID-19 PCR test resulted positive, and his chest CT scan revealed that the pulmonary involvement was mild to moderate (Fig. 1).

The requested routine laboratory tests showed no specific pathological findings. The patient got admitted for supportive care and oxygen therapy because of his medical condition and comorbidities. The patient's Cellcept was temporarily discontinued. Due to his comorbidity and lung CT scan, with the evaluation of his renal function, Remdesivir was prescribed for him. After ten days, he was discharged with stable vital signs and recommended continuing his immunosuppressive medications as prescribed. With a delay, he received his second dose of Sputnik V, COVID-19 vaccination on July 3, 2021, and his third dose of AstraZeneca vaccine on November 17, 2021.

3. Discussion

Novel coronavirus disease 2019 (COVID-19) is a novel virus caused by severe acute respiratory syndrome virus (SARS-CoV-2) [8,9]. This virus and COVID-19 pandemic disease affect every aspect of human life [8]. Multiple risk factors could affect the severity and mortality [10] of COVID-19 disease, and one of the risk factors includes immunosuppressive conditions like kidney transplantation [8]. The Centers for Disease Control and Prevention (CDC) considers immunocompromised patients, including requiring immunosuppression after renal transplantation and a high risk of severe SARS-CoV-2 disease [8].

The current coronavirus disease 2019 (COVID-19) pandemic response relies heavily on vaccination [11]. Although mRNA-based vaccines elicit a robust immune response in the general population, the immunization rates of immunocompromised patients, including solid organ transplant recipients, have not been investigated explicitly in the pivotal trials for mRNA-1273 and BNT162b2 [12,13] or viral vector-based vaccines (AstraZeneca/Oxford University, Johnson & Johnson's Janssen COVID-19 Vaccine, and Sputnik V) [11].

There has been little knowledge of COVID-19 in kidney transplant recipients (KTRs) regarding clinical presentation, management, factors influencing mortality, and antibody response. COVID-19 has a 28% mortality rate (range 16–30%) among KTRs, compared to 1–5% in the general population [14,15]. At presentation, lymphopenia and hypoxemia (SpO2 94%) are associated with a greater mortality rate in hospitalized KTRs [16,17]. In addition, KTRs have an increased viral load for a more extended period. It is critical to monitor these patients until the viral load is negligible by polymerase chain reaction (PCR) to prevent disease spread in the community [18]. Due to the rapid progression of COVID-19, kidney transplant recipients with catastrophic COVID-19 must be hospitalized, and the need for intensive care and hemodialysis increases the risk of death [18].

The adjusted odds ratio (aOR) for mortality risk in transplant recipients, solid organ neoplasm, and hematological neoplasm was 3.12 (95% CI 2.23–4.36), 1.39 (95% CI 1.18–1.63), and 2.31 (95% CI 1.76–3.03), respectively [19,20]. There is scarce data on vaccination's efficacy and safety profile in solid organ transplant recipients, including kidney transplant recipients (KTR) [20]. According to Boyarsky et al. a recent study of 436 solid organ transplant recipients discovered that a small proportion (17%) tested positive for SARS-CoV-2 antibody after their first dose of mRNA-vaccination (Moderna) [21]. As previously stated, the KTR developed COVID-19 infection with positive PCR and lung involvement after the first dose of Sputnik V vaccination in our case. Boyarsky's study, which found a low antibody response after the first dose in solid organ transplant recipients, could help explain this [21]. According to recent evidence among immunosuppressant patients, including KTR, a third-dose mRNA vaccination (Pfizer) significantly improves the vaccine's immunogenicity [22]. The patient in our case also received a third dose of COVID-19 immunization, which may have increased his immunogenicity.

To the best of our knowledge, no COVID-19 infection case among KTR has been reported after the first dose of the vaccine. However, the low level of antibody response after the first dose of the mRNA vaccine supports the etiology of our case [21]. So, in our case, a high-risk patient with two episodes of kidney transplantation, as well as a high-risk job as a healthcare professional, developed COVID-19 infection after receiving the first dose of the Sputnik V vaccine. This COVID-19 infection was not catastrophic, suggesting that it was caused by the first Sputnik V vaccination and antibody responses even in immunocompromised patients.

It is worthy to note that even after receiving the full dose of COVID-19 vaccination, anyone can become infected with the virus, and there are no differences between immunocompromised patients and normal people. Even after vaccination, everyone, especially KTR patients, should follow protocols. The main takeaway from this case could be that in immunocompromised patients, such as KTR, we should be aware of low antibody response after COVID-19 vaccination and follow strict protocols and booster doses of vaccination to improve immunogenicity in these populations.

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Ethical approval

This case report is presented based on CARE guidelines. The patient signed the written informed consent form.

Consent

Informed consent was obtained in both written and verbal format from the patient to report this case.

Author contribution

YSH: Study conception and design, data collection and draft manuscript preparation, SMKA: Study conception and design, MR: Study conception and design.

Research registration

None declared.

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Declaration of competing interest

The authors declare that they have no competing interests.

References

[1] S. Caillard, D. Anglicheau, M. Matignon, A. Durrbach, C. Greze, L. Frimat, O. Thaunat, T. Legris, V. Moal, P.F. Westeel, N. Kamar, P. Gatault, R. Snanoudj, A. Sicard, D. Bertrand, C. Colosio, L. Couzi, J.M. Chemouny, C. Masset, G. Blancho, J. Bamoulid, A. Duveau, N. Bouvier, N. Chavarot, P. Grimbert, B. Moulin, Y. Le Meur, M. Hazzan, An initial report from the French SOT COVID Registry suggests high mortality due to COVID-19 in recipients of kidney transplants, Kidney Int. 98 (6) (2020) 1549–1558.

[2] S. Caillard, O. Thaunat, COVID-19 vaccination in kidney transplant recipients, Nat. Rev. Nephrol. 17 (12) (2021) 785–787.

[3] L. Illesy, D. Kovács, R.P. Szabó, L. Asztalos, B. Nemes, Autosomal dominant polycystic kidney disease transplant recipients after kidney transplantation: a single-center experience, Transplant. Proc. 49 (7) (2017) 1522–1525.

[4] A. Mohammadi, S.M.K. Aghamir, The hypothesis of the COVID-19 role in acute kidney injury: a literatures review, Translat. Res.Urol. 2 (3) (2020) 74–78.

[5] A. Fakhr Yasseri, D. Taheri, Urinary stone management during COVID-19 pandemic, Translat. Res.Urol. 2 (1) (2020) 1–3.

[6] S. Caillard, N. Chavarot, D. Bertrand, N. Kamar, O. Thaunat, V. Moal, C. Masset, M. Hazzan, P. Gatault, A. Sicard, J.M. Chemouny, J.P. Rerolle, C. Colosio, H. Francois, J. Bamoulid, N. Bouvier, A. Duveau, D. Anglicheau, G. Blancho, Occurrence of severe COVID-19 in vaccinated transplant patients, Kidney Int. 100 (2) (2021) 477–479.

[7] R.A. Agha, T. Franchi, C. Sohrabi, G. Mathew, A. Kerwan, A. Thoma, A.J. Beamish, A. Noureldin, A. Rao, B. Vasudevan, The SCARE 2020 guideline: updating consensus surgical CAse REport (SCARE) guidelines, Int. J. Surg. 84 (2020) 226–230.

[8] K.M. Johnson, J.J. Belfer, G.R. Peterson, M.R. Boelkins, L.E. Dumkow, Managing COVID-19 in renal transplant recipients: a review of recent literature and case supporting corticosteroid-sparing immunosuppression, Pharmacotherapy 40 (6) (2020) 517–524.

[9] F. Khatami, M. Saatchi, S.S.T. Zadeh, Z.S. Aghamir, A.N. Shabestari, L.O. Reis, S.M. K. Aghamir, A meta-analysis of accuracy and sensitivity of chest CT and RT-PCR in COVID-19 diagnosis, Sci. Rep. 10 (1) (2020) 22402.

[10] Y. Sharifi, M. Payab, E. Mohammadi-Vajari, S.M.M. Aghili, F. Sharifi, N. Mehrdad, E. Kashani, Z. Shadman, B. Larijani, M. Ebrahimpur, Association between cardiometabolic risk factors and COVID-19 susceptibility, severity and mortality: a review, J. Diabetes Metab. Disord. (2021) 1–23.

[11] W. Doerfler, Adenoviral vector DNA- and SARS-CoV-2 mRNA-based covid-19 vaccines: possible integration into the human genome - are adenoviral genes expressed in vector-based vaccines? Virus Res. 302 (2021) 198466.

[12] F.P. Polack, S.J. Thomas, N. Kitchin, J. Absalon, A. Gurtman, S. Lockhart, J. L. Perez, G. Pérez Marc, E.D. Moreira, C. Zerbini, R. Bailey, K.A. Swanson, S. Roychoudhury, K. Koury, P. Li, W.V. Kalina, D. Cooper, R.W. Frenck Jr., L. L. Hammitt, Ö. Türeci, H. Nell, A. Schaefer, S. Ünal, D.B. Tresnan, S. Mather, P. R. Dormitzer, U. Şahin, K.U. Jansen, W.C. Gruber, Safety and efficacy of the BNT162b2 mRNA covid-19 vaccine, N. Engl. J. Med. 383 (27) (2020) 2603–2615.

[13] L.R. Baden, H.M. El Sahly, B. Essink, K. Kotloff, S. Frey, R. Novak, D. Diemert, S. A. Spector, N. Rouphael, C.B. Creech, J. McGettigan, S. Khetan, N. Segall, J. Solis, A. Brosz, C. Fierro, H. Schwartz, K. Neuzil, L. Corey, P. Gilbert, H. Janes, D. Follmann, M. Marovich, J. Mascola, L. Polakowski, J. Ledgerwood, B.S. Graham, H. Bennett, R. Pajon, C. Knightly, B. Leav, W. Deng, H. Zhou, S. Han, M. Ivarsson, J. Miller, T. Zaks, Efficacy and safety of the mRNA-1273 SARS-CoV-2 vaccine, N. Engl. J. Med. 384 (5) (2021) 403–416.

[14] S. Bell, J. Campbell, J. McDonald, M. O'Neill, C. Watters, K. Buck, Z. Cousland, M. Findlay, N.I. Lone, W. Metcalfe, COVID-19 in patients undergoing chronic kidney replacement therapy and kidney transplant recipients in Scotland: findings and experience from the Scottish renal registry, BMC Nephrol. 21 (1) (2020) 1–12.

[15] L.B. Hilbrands, R. Duivenvoorden, P. Vart, C.F. Franssen, M.H. Hemmelder, K. J. Jager, L.M. Kieneker, M. Noordzij, M.J. Pena, H.d. Vries, COVID-19-related mortality in kidney transplant and dialysis patients: results of the ERACODA collaboration, Nephrol. Dial. Transplant. 35 (11) (2020) 1973–1983.

[16] L.S. Belli, C. Fondevila, P.A. Cortesi, S. Conti, V. Karam, R. Adam, A. Coilly, B. G. Ericzon, C. Loinaz, V. Cuervas-Mons, Protective role of tacrolimus, deleterious role of age and comorbidities in liver transplant recipients with Covid-19: results from the ELITA/ELTR multi-center European study, Gastroenterology 160 (4) (2021) 1151–1163, e3.

[17] H. Rahimzadeh, S.S. Tamehri Zadeh, A. Khajavi, M. Saatchi, L.O. Reis, F. Guitynavard, S. Dehghani, V. Soleimani, S.M.K. Aghamir, The tsunami of COVID-19 infection among kidney transplant recipients: a single-center study from Iran, J. Epidemiol. Global Health 11 (4) (2021) 389–396.

[18] S. Jasuja, G. Sagar, A. Bahl, S. Verma, COVID-19 infection clinical profile, management, outcome, and antibody response in kidney transplant recipients: a single centre experience, Int. J. Nephrol. (2021), 2021.

[19] I. Suárez-García, I. Perales-Fraile, A. González-García, A. Muñoz-Blanco, L. Manzano, M. Fabregate, J. Díez-Manglano, E.F. Aizpuru, F.A. Fernández, A. G. García, R. Gómez-Huelgas, J.M. Ramos-Rincón, In-hospital mortality among immunosuppressed patients with COVID-19: analysis from a national cohort in Spain, PLoS One 16 (8) (2021), e0255524.

[20] Z. Yan, M. Yang, C.L. Lai, COVID-19 vaccinations: a comprehensive review of their safety and efficacy in special populations, Vaccines (Basel) 9 (10) (2021).

[21] B.J. Boyarsky, W.A. Werbel, R.K. Avery, A.A.R. Tobian, A.B. Massie, D.L. Segev, J. M. Garonzik-Wang, Immunogenicity of a single dose of SARS-CoV-2 messenger RNA vaccine in solid organ transplant recipients, JAMA 325 (17) (2021) 1784–1786.

[22] N. Kamar, F. Abravanel, O. Marion, C. Couat, J. Izopet, A. Del Bello, Three doses of an mRNA covid-19 vaccine in solid-organ transplant recipients, N. Engl. J. Med. 385 (7) (2021) 661–662.