GERIATRYCZNE PROBLEMY KLINICZNE / GERIATRICS CLINICAL PROBLEMS
Otrzymano/Submitted: 15.06.2022 • Zaakceptowano/Accepted: 20.06.2022

The first case of reinfection with Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) in a hemodialysis patient in northern Poland

Reinfekcja wirusem SARS-CoV-2 u pacjenta dializowanego – pierwszy przypadek w północnej Polsce

Ewelina Puchalska-Reglińska[1], Alicja Dębska-Ślizień[2], Tomasz Smiatacz[3], Sławomir Lizakowski[2], Aleksandra Parczewska[1]

[1] 7th Navy Hospital, Gdańsk, Poland
[2] Department of Nephrology, Transplantation Medicine and Internal Medicine, Medical University of Gdańsk, Poland
[3] Department of Infectious Diseases, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Patients with chronic kidney disease (CKD) who undergo maintenance hemodialysis are more susceptible to SARS-CoV-2 infection than patients receiving other types of renal replacement therapy and untreated individuals in the general population. We present a case of a 68-year-old CKD patient with obstructive nephropathy treated with hemodialysis since June 2020 who was diagnosed with SARS-CoV-2 reinfection 46 days after the primary infection—being the first such case in northern Poland. Both infectious episodes were confirmed by RT-PCR, were clinically mild, and required no COVID-19-specific treatment. The following facts speak in favor of reinfection rather than a laboratory error: positive results of RT-PCR tests for SARS-CoV-2 on three consecutive occasions during the primary infection, followed by repeatedly negative results of RT-PCR tests for SARS-CoV-2 on further three occasions, followed by, again, positive results of RT-PCR tests for SARS-CoV-2 on samples collected on the day of reinfection diagnosis and three days later, along with a simultaneously positive result of the test for IgG antibody on the third day of reinfection. *Geriatria 2022;16:107-109. doi: 10.53139/G.20221610*

Keywords: Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), reinfection, hemodialysis patient

Streszczenie

Pacjenci z przewlekłą chorobą nerek (PChN), którzy są hemodializowani są bardziej narażeni na infekcję wirusem SARS-CoV-2 niż osoby zdrowe lub leczone innymi metodami nerkozastępczymi. Opisujemy przypadek 69-letniego pacjenta z PChN wtórnie do nefropatii zaporowej, hemodializowanego od czerwca 2020 r., u którego rozpoznano reinfekcję wirusem SARS-CoV-2 po 46 dniach od pierwotnej infekcji. Jest to pierwszy tego typu przypadek w Polsce północnej. Obie infekcje potwierdzono badaniem RT-PCR, miały łagodny przebieg kliniczny oraz nie wymagały swoistego leczenia COVID-19. Poniższe fakty świadczą o reinfekcji, a nie błędzie laboratoryjnym: 3 kolejne wyniki badania RT-PCR dodatnie pod kątem SARS-CoV-2 podczas pierwotnej infekcji, następnie ujemne wyniki badania RT-PCR w trzy różne dni oraz dodatnie badania RT-PCR w dniu reinfekcji oraz 3 dni później, dodatni wynik badania pod kątem przeciwciał IgG w trzecim dniu reinfekcji. *Geriatria 2022;16:107-109. doi: 10.53139/G.20221610*

Słowa kluczowe: Drugi koronawirus ciężkiego ostrego zespołu oddechowego (Severe Acute Respiratory Syndrome Coronavirus 2, SARS-CoV-2), reinfekcja, pacjent hemodializowany

Introduction

Patients on maintenance hemodialysis are more susceptible to SARS-CoV-2 infection than those receiving other types of renal replacement therapy, and cases of reinfection have also been reported amongst them. SARS-CoV-2 reinfection is defined as an infection confirmed by RT-PCR >28 days after obtaining a negative result following an infection confirmed by RT-PCR whose clinical symptoms had subsided. [4]

We report below a case of a 68-year-old patient diagnosed with SARS-CoV-2 reinfection after 46 days and a rapid disappearance of anti-SARS-CoV-2 antibodies.

To prevent the spread of SARS-CoV-2 infection in dialysis centers, patients undergo an RT-PCR or antigen test whenever they report or display symptoms suggestive of infection. The problem, however, is the asymptomatic patients who can unknowingly infect many others. In this group of patients, the fact that the patient is a convalescent or has been fully immunized cannot be taken into account.

Material and methods

In this report, we describe our experience with a patient reinfected with SARS-CoV-2. It was the only such patient out of 384 patients treated at our center over the period of 15 months. The patient was male and the cause of his CKD was obstructive nephropathy. He displayed moderate intellectual disability and did not have any significant medical history. His first hemodialysis was in June 2020. On both occasions, the infection was detected incidentally (for the first time, the RT-PCR test was performed due to contact with another infected patient, and for the second time, the test was performed before the replacement of vascular access).

Results

On October 2020 a 68-year-old CKD patient was referred to a dialysis unit dedicated to patients infected with SARS-CoV-2 due to an incidentally detected infection with this virus (the patient had undergone the RT-PCR test for SARS-CoV-2 due to contact with another infected patient at the same dialysis center). The patient did not report or display any clinical manifestations of COVID-19 at that time. Because of his intellectual disability, the patient was admitted to the Psychiatric Department dedicated at that time to patients infected with SARS-CoV-2. The patient did not undergo any imaging studies, and the basic laboratory tests performed at that time did not reveal any abnormalities characteristic of COVID-19. His capillary blood SpO_2 ranged between 94% and 96%. He did not require supplemental oxygen or any COVID-19-specific drugs, such as steroids, remdesivir or antibiotics. During 19 days of hospitalization, he underwent 8 hemodialysis sessions. After receiving a negative result of the RT-PCR test for SARS-CoV-2, the patient was discharged home with instructions to continue his renal replacement therapy at his hemodialysis center. 26 days after discharge from the hospital, another negative PCR result was obtained.

After another 18 days, that is 44 days after discharge from the hospital, the patient underwent an RT-PCR test for SARS-CoV-2 before hospital admission for elective replacement of his vascular access for hemodialysis. The test returned positive. As had been the case in October, the patient did not show any symptoms of COVID-19. He was admitted to our hospital again, this time to the Internal Medicine Department. On admission, he underwent an RT-PCR test for SARS-CoV-2, which returned positive, a test for IgM and IgG antibodies to the virus, which returned positive for IgG antibodies, and a computed tomography of the chest, which showed no pathologies. Laboratory tests, which were repeated on multiple occasions, revealed, as the only abnormality, an elevated D-dimer level at 1160.17 ng/ml (normal range: 0–500.00 ng/ml). The patient's SpO_2 ranged between 94% and 98%. During the hospitalization, the test for SARS-CoV-2 IgG antibody was repeated and returned reactive. The hospitalization lasted 23 days, and 14 hemodialysis sessions were performed. Again, no COVID-19-specific treatment was required. After obtaining a negative result of an RT-PCR test for SARS-CoV-2, the patient was discharged home and with instructions to continue his renal replacement therapy at his hemodialysis center. On the day of discharge, the test for IgM and IgG antibodies was nonreactive.

Test results for this patient are provided in Table I.

Table I. SARS-CoV-2 RT PCR and SARS-CoV-2 IgM and IgG antibodies tests results

Date	Results	
SARS-CoV-2 RT PCR		
Day 0	positive	
Day 4	positive	
Day 14	positive	
Day 21	negative	
Day 39	negative	
Day 57	positive	
Day 59	positive	
Day 77	negative	
SARS-CoV-2 antibodies		
Day 60	IgM negative [a]	IgG positive [a]
Day 69	Total Ig M and IgG positive [b]	
Day 81	IgM 0,249 [c] negative	IgG 0,573 [c] negative

[a] immunochromatographic test (STANDARD Q COVID-19 IgM / IgG combo Test, SD BIOSENSOR). [b] ECLIA method on Combo apparatus (screening test), [c] Snibe test, CLIA method on Maglumi 800 device ((<1 AU/mL non-reactive result; >1 AU/mL reactive result)

Discussion

Cases of SARS-CoV-2 reinfection among hemodialysis patients have already been reported. Tomassini et al. defined SARS-CoV-2 reinfection as an infection confirmed by RT-PCR >28 days after obtaining a negative result of an RT-PCR test for SARS-CoV-2 following a SARS-CoV-2 infection confirmed by RT-PCR whose clinical symptoms had subsided. [4]

The following facts support the reinfection and not the laboratory error: repeated positive results of the RT-PCR tests for SARS-CoV-2 obtained three times within 14 days, and then repeated negative results of the RT-PCR tests for SARS-CoV-2 also obtained three times within 30 days, followed by repeated positive SARS-CoV-2 RT-PCR tests in samples taken 46 and 49 days after the first negative PCR test result and simultaneously positive IgG antibody test 50 days after the first negative result PCR test. The isolated positivity for IgG in the chromatographic immunoassay suggests that the SARS-CoV-2 infection was acquired a while ago. A nonreactive (negative) result in both classes (IgM and IgG) usually means no past exposure to SARS-CoV-2. However, in this case, the previous results of serological and RT-PCR tests may indicate a rapid disappearance of the antibodies.

In the 14 cases of SARS reinfection in hemodialysis patients reported in the literature, Colson et al. indicated that the time between the diagnosis of the first and second infection ranged between 19 and 142 days. The results of serological tests performed during the second infection were also different: the result obtained by different methods was positive (for IgG or for IgM/IgG) in 7 patients and negative in 4 patients, and in 3 research studies, serological tests were not performed. [5]. Immune dysfunction is observed in hemodialysis patients in terms of both cell- and antibody-mediated immunity. Hemodialysis patients have lower counts of T cells (both helper and cytotoxic cells), and NK cells, and it is not uncommon for them not to respond to immunization by antibody formation (as is the case with hepatitis B vaccine, for example). Because of these abnormalities, hemodialysis patients infected with SARS-CoV-2 rarely mount an increased inflammatory response and develop the so-called cytokine storm, which reduces the risk of their illness progressing to multi-organ failure and results in a milder clinical course of COVID-19 compared to non-hemodialysis patients with similar comorbidities. Consequences of this anergy may also include a rapid disappearance of anti-SARS-CoV-2 antibodies.

In conclusion, reinfection with SARS-CoV-2 may occur in hemodialysis patients. It is favored by the compromised function of their immune systems. The symptomatic course and the potential risk of infecting other patients by such asymptomatic patients merit special attention. Also, a previous documented infection and virus elimination confirmed by PCR may be deceptive.

Conflict of interest
None

Correspondence address
Ewelina Puchalska-Reglińska
7 Szpital Marynarki Wojennej,
ul. Polanki 117 Gdańsk 80-305
(+48 58) 552 65 66
e.puchalska@7szmw.pl

Piśmiernnictwo/References

1. Larson D, Brodniak SL, Voegtly LJ, et al. A Case of Early Reinfection With Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). https://doi.org/10.1093/cid/ciaa1436.
2. Mendoza JM, Alcaide ML. COVID-19 in a patient with end-stage renal disease on chronic in-center hemodialysis after evidence of SARS-CoV-2 IgG antibodies. Reinfection or inaccuracy of antibody testing. https://doi.org/10.1016/j.idcr.2020.e00943.
3. Lafaie L, Celarier T, Goethals L, et al: Recurrence or Relapse of COVID-19 in Older Patients: A Description of Three Cases. http://doi.org/10.1111/jgs.16728.
4. Tomassini S, Bird PW, Folwell A, et al.: Setting the criteria for SARS-CoV-2 reinfection – six possible cases. http://doi.org/10.1016/j.jinf.2020.08.11.
5. Colson P, Finaud M, Levy N. Evidence of SARS-CoV-2 re-infection with a different genotype. http://doi.org/10.1016/j.jinf.2020.11.01.
6. Puchalska-Reglińska E, Debska-Slizien A, Biedunkiewicz B, et al. Extremely high mortality in COVID-19 hemodialyzed patients before the anti-SARS-CoV-2 vaccination era. Large database from the North of Poland. Pol Arch Intern Med. 2021; DOI: 10.20452/pamw.16028.
7. Flisiak R, Horban A, Jaroszewicz J, et al. Management of SARS-CoV-2 infection: recommendations of the Polish Association of Epidemiologists and Infectiologists as of April 26, 2021. Pol Arch Intern Med. 2021;131:487-96.