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Suspected Pneumonia Caused by Coronavirus Disease 2019 After Kidney Transplantation: A Case Report

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ABSTRACT

Background. Coronavirus disease 2019 (COVID-19) infection may become more severe in those who have undergone kidney transplantation than in the general population. False-negative reverse transcription—polymerase chain reaction (RT-PCR) results have been reported for COVID-19 infection. Patients might carry infection even though RT-PCR results are negative.

Case report. A 65-year-old man with a 19-year history of ABO-incompatible kidney transplantation presented with fever and arthralgia. Although the RT-PCR result was negative, a focal slit-glass shadow in the left upper lobe on computed tomography (CT) suggested COVID-19 pneumonia. His symptoms did not improve until after 10 days, and CT showed multiple slit-glass shadows in the bilateral lung fields. However, RT-PCR remained negative. The patient was admitted, and mycophenolate mofetil was discontinued. Anticoagulants were administered on the third day of hospitalization. Because of poor oxygenation, the patient was intubated in the intensive care unit on the fifth day, and sivelestat sodium was administered. The patient was extubated on the 12th day after improvement in oxygenation. There was no exacerbation, and CT showed improvements on day 51.

Conclusion. We report a case of pneumonia with suspected COVID-19 infection 18 years after living donor kidney transplantation. If COVID-19 is suspected, infection control and aggressive therapeutic interventions should be undertaken while considering the possibility of a positive result.

The coronavirus disease 2019 (COVID-19) infection can be more severe in patients who have undergone kidney transplantation than in the general population. In addition, false-negative reverse transcription—polymerase chain reaction (RT-PCR) has been reported even in those with active COVID-19 infection. Patients might still have COVID-19 infection even when RT-PCR results are negative. In this study, we report a case of suspected COVID-19 pneumonia after a living donor kidney transplantation. Written informed consent was obtained from the patient for publication of this case report and accompanying images.

CASE PRESENTATION

A 65-year-old man underwent ABO-incompatible kidney transplantation for chronic renal failure due to IgA nephropathy. The patient’s medical history was notable for recurrent IgA nephropathy (bilateral palatine tonsillectomy was performed), adenocarcinoma of the lung (left thoracoscopic partial pneumonectomy was performed), cerebral infarction, brain tumor, hypertension, dyslipidemia, and diabetes mellitus. The patient was maintained on an immunosuppressive therapy regimen that included tacrolimus, mycophenolate mofetil, and methylprednisolone. Nineteen years later, the patient presented with fever and arthralgia. Computed tomography (CT) showed a focal slit-glass shadow in the left upper lobe, suggesting COVID-19 pneumonia, although RT-PCR was negative. Considering the
positive pneumococcal antigen in the urine, the patient was diagnosed with pneumococcal pneumonia and started on oral amoxicillin-clavulanic acid. The symptoms did not improve despite 10 days of treatment, and the patient’s fever and cough persisted. CT showed multiple slit-glass shadows in the bilateral lung fields (Fig 1), leading to the diagnosis of COVID-19 pneumonia; however, the RT-PCR performed on the same day was negative. Based on the clinical symptoms and CT findings, the patient was admitted to the hospital as an emergency case with a diagnosis of suspected COVID-19 pneumonia. Physical examination revealed a Glasgow Coma Scale score of E4V5M6; body temperature was 38.2°C; blood pressure was 118/78 mm Hg; pulse was 88 beats/min; and blood oxygen saturation was 97% (in room air). Laboratory data showed an increase in the white blood cells (13,120 /µL) and C-reactive protein (9.50 mg/dL) because of an inflammatory reaction. Blood urea nitrogen (46.3 mg/dL) and serum creatinine (2.22 mg/dL) were also elevated (Table 1). The patient’s clinical course is shown in Figure 2.

Ciprofloxacin and bactolamine (ST fixed-dose combination) were started on the first day of hospitalization after initially suspecting bacterial pneumonia and Pneumocystis jirovecii pneumonia; mycophenolate mofetil was discontinued. As a septicemic treatment, massive intravenous immunoglobulin and pulsed steroid therapy were administered on the second day. The antimicrobial agent was changed to meropenem, and anticoagulants (nafamostat mesylate) were administered owing to the upward trend of C-reactive protein in the blood test on the third day. The patient was transferred from the general ward to the intensive care unit because of poor oxygenation, with a blood oxygen saturation of 90% under an oxygen mask with a flow rate of 8 L/min. The patient was intubated and placed on a ventilator on the fifth day. Sivelestat was administered as a treatment for acute respiratory distress syndrome. CT showed markedly enlarged frosted margins in the bilateral lung fields on the fifth day (Fig 3). After improvement in the general condition, the patient was extubated and transferred to a general ward the following day, with good oxygenation on the 13th day. No exacerbation was observed. A CT scan to evaluate pneumonia on the 51st day revealed a decrease in the density of the bilateral lung slit and infiltrate shadows and a tendency for improvement (Fig 4). The patient was discharged on the 59th day, with the renal function restored to the level before treatment.

**DISCUSSION**

In this study, the patient was diagnosed with pneumonia suspected to be caused by a COVID-19 infection that developed 18 years after kidney transplantation. False-negative RT-PCR results have been reported even in hospitalized patients with clinically diagnosed COVID-19 [1,2]. False-negative results have also been confirmed after 2 negative RT-PCR results [1]. The accuracy of specimen collection and the number of antigens might affect the test results. In this case, there was no change from the initial diagnosis. Although we confirmed a negative RT-PCR at the time of initial diagnosis and hospitalization, it is possible that the test would have been positive if the patient had been retested. Even if RT-PCR is negative, COVID-19 can be clinically suspected based on the findings of a chest CT [3]. In this case, COVID-19 pneumonia was suspected based on clinical symptoms and imaging findings. COVID-19 infection after living donor kidney transplantation is associated with a higher mortality rate (28%) than in the general population or in patients aged older than 70 years [4]. Treatment with mycophenolic acid and everolimus has been reportedly reduced or discontinued (68%) and calcineurin inhibitors discontinued (32%) [5]. Currently, there are no treatment options available for COVID-19 infection, and adjuvant

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**Table 1. Blood Examination Showing WBC and CRP Increased by Inflammatory Reaction.**

| WBC 13,120 /µL | TP 5.5 g/dL | Na 135 mEq/L |
|---------------|------------|-------------|
| Neut 73 %     | Alb 2.8 g/dL | K 5.1 mEq/L |
| MONO 8 %      | AST 38 IU/l | Cl 109 mEq/L |
| LYMHP 19 %    | ALT 22 IU/l |                          |
| RBC 3.98 × 10^6 /µL | Cr 2.22 mg/dL | PT 12.7 sec |
| Hb 11.7 g/dL  | BUN 46.3 mg/dL | FDP 2.0 µg/mL |
| MCV 87.4 Fl   | LDH 287 IU/l |                          |
| PLT 2.69 × 10^3 /µL | CRP 9.50 mg/dL |                          |

BUN (46.3 mg/dL) and Cr (2.22 mg/dL) were also elevated.

Alb, albumin; AST, asparagine aminotransferase; ALT, alanine aminotransferase; APTT, activated partial thromboplastin time; BUN, blood urea nitrogen; Cr, creatinine; CRP, C-reactive protein; Cl, chloride; EOSI, eosinophil; FDP, fibrinogen degradation products; Hb, hemoglobin; K, potassium; LYMHP, lymphocyte; LDH, lactate dehydrogenase; MONO, monocyte; MCV, mean corpuscular volume; Na, sodium; Neut, neutrophil; PT, prothrombin time; PLT, platelets; RBC, red blood cells; TP, total protein; T-Bil, total bilirubin; WBC, white blood cell.
Fig 2. Clinical course of the patient with suspected coronavirus disease 2019 (COVID-19) pneumonia after kidney transplantation. The patient was transferred from the general ward to the intensive care unit because of poor oxygenation, with a blood oxygen saturation of 90% under an oxygen mask of 8 L/min, and was intubated and placed on a ventilator on the fifth day of hospitalization. The patient's general condition improved, and the patient was extubated and transferred to a general ward the following day with good oxygenation on the 13th day.

Fig 3. Computed tomography showed markedly enlarged frosted margins in the bilateral lung fields on the fifth day.

Fig 4. Computed tomography showed a decrease in the density of the bilateral lung slit and infiltrate shadows on the 51st day.
therapy includes corticosteroid/anticytokine treatment and immunosuppressant/immunoglobulin therapy [6]. Remdesivir, dexamethasone, and baricitinib have been approved for use in Japan. Heparin is indicated in patients with moderate disease II and above [7]. Anticoagulation has been reported to be the most crucial treatment for reducing COVID-19–related mortalities [8]. We administered anticoagulants (nafamostat mesylate) to this patient because of the lack of established treatment methods at the time. However, we subsequently changed the treatment to intravenous immunoglobulin, steroid pulse, and anticoagulants (nafamostat mesylate). Sivelestat sodium has been reported to be effective against acute lung injury and acute respiratory distress syndrome [9]. A previous study reported the efficacy of sivelestat sodium in cases of severe COVID-19 pneumonia requiring ventilator use. This patient was administered sivelestat at the time of admission to the intensive care unit [10].

In conclusion, we report a case of pneumonia with suspected COVID-19 infection 18 years after living kidney transplantation. If COVID-19 is suspected, infection control and aggressive therapeutic interventions should be undertaken while being mindful of positive COVID-19 even if RT-PCR results are negative.

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