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Clinical Outcomes of Sotrovimab Treatment in 10 High-Risk Patients with Mild COVID-19: A Case Series

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Case series
Patients: —
Final Diagnosis: COVID-19
Symptoms: Cough • fever • sore throat
Medication: —
Clinical Procedure: —
Specialty: Pulmonology

Objective: Unusual or unexpected effect of treatment

Background: Although sotrovimab reduces the risk of hospitalization or death due to COVID-19, there have been few reports of its use in clinical practice. Particularly, information on the effectiveness of sotrovimab against the omicron variant of the virus is limited. We present 10 cases of COVID-19 treated with sotrovimab at our unit between December 2021 and February 2022.

Case Reports: The age of the patients ranged from 32 to 81 years (median: 40 years). The comorbidities included lung cancer, cardiovascular disease, chronic kidney disease requiring hemodialysis, and AIDS. Two of the patients were also organ recipients. Oxygen saturation (SpO_2) was above 97% in all patients. None of the patients presented with pneumonia on admission. However, blood test results showed that all patients had risk factors for severe COVID-19 outcomes. The interval from symptom onset to sotrovimab administration and resolution ranged from 2 to 5 days (median: 2 days) and 2 to 15 days (median: 5 days), respectively. Only 1 patient developed pneumonia and was treated with remdesivir after sotrovimab administration. However, this patient did not require oxygen therapy. Although no moderate to severe adverse events were observed, a mild adverse event was observed in 1 patient.

Conclusions: Sotrovimab could be safe and effective in preventing progression of COVID-19 in patients with a variety of underlying diseases and who are at high risk of severe disease outcomes.

Keywords: COVID-19 • SARS-CoV-2 Variants • Sotrovimab

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Background

Since December 2019, COVID-19 has spread rapidly worldwide. A variety of therapeutic agents against the disease have been developed, including neutralizing antibodies. Sotrovimab is a pan-sarbecovirus monoclonal antibody designed to prevent COVID-19 progression in patients at high risk when administered in the early disease course. Moreover, it has been shown to reduce the risk of hospitalization or death by 85% [1]. In Japan, sotrovimab was approved on September 27, 2021.

Since November 2021, the number of patients infected with the omicron variant of SARS-CoV-2, which gradually replaced the previously dominant delta variant, has been increasing rapidly [2]. In Japan, similar events occurred since December 2021. Although the omicron variant was shown to be resistant to neutralization by several therapeutic antibodies in vitro, there has been some evidence indicating that sotrovimab may be effective against this new variant [3]. Nevertheless, the available information on the effectiveness of sotrovimab against COVID-19 (including the omicron variant) in clinical practice is limited. In addition, the safety and efficacy of sotrovimab in patients with various comorbidities are unknown.

We present the clinical outcomes of sotrovimab treatment among 10 high-risk patients with mild COVID-19 at our hospital between December 2021 and February 2022.

Case Report

The demographic and clinical data of the 10 patients are presented in **Table 1**. Genome sequencing was performed in 2 patients and confirmed their infection with the omicron variant. The patients' comorbidities included lung cancer (n=2, 20%), cardiovascular disease (n=2, 20%), chronic kidney disease (n=3, 30%), and AIDS (n=1, 10%). In addition, 2 of the patients (20%) had received an organ transplant. Although 8 of the 10 patients had received 2 doses of a vaccine against COVID-19, the remaining 2 were unvaccinated. On admission, fever was a common symptom in the patients (n=9, 90%). In addition, oxygen saturation (SpO_2) was in the 97% to 100% range (median value: 97%) on room air. None of the patients had signs of pneumonia on computed tomography. The laboratory test results on admission are presented in **Table 2**. Blood examination revealed lymphopenia (n=8), elevated creatinine levels (n=4), and elevated lactate dehydrogenase levels (n=5), which are known risk factors for COVID-19 progression. Therefore, all patients were at a higher risk of developing severe disease outcomes according to these blood test results.

The interval from disease onset to sotrovimab administration and symptom resolution ranged between 2 and 5 days (median: 2 days) and between 2 and 15 days (median: 5 days), respectively. Adverse events were observed in only 1 patient (case 6) who developed skin rash, which was treated with topical steroids. The patient also developed pneumonia and received remdesivir. However he did not require oxygen therapy. The remaining patients also did not require any oxygen therapy. All patients were discharged after fulfilling the hospital discharge criteria in Japan [4]. There were no significant sequelae of COVID-19 in any of the patients.

Discussion

The 10 cases described herein highlight several noteworthy findings. First, sotrovimab may have effectively prevented progression in patients with a variety of comorbidities and infected by the omicron variant of SARS-CoV-2. Second, sotrovimab administration was safe, with no observed moderate or severe adverse events.

Neutralizing antibodies, including sotrovimab, are administered to patients with mild COVID-19 who have risk factors for developing a severe condition. In a phase 3 trial of sotrovimab, risk factors for progression to severe disease outcomes were defined. These risk factors include age above 55 years, obesity (body mass index >30), diabetes requiring medication, chronic kidney disease, congestive heart failure (NYHA class II, III, or IV), chronic obstructive pulmonary disease, and moderate-to-severe asthma. However, data from patients with renal or cardiac disease was limited [1]. Our case series included 3 cases of renal disease and 3 cases of cardiac disease. Furthermore, 2 of 10 patients were unvaccinated for COVID-19.

The risk factors associated with COVID-19 severity include malignancy [5], immunodeficiency due to organ transplantation [6], treatment with steroids [7] or anti-rheumatic drugs [8], and HIV infection with a CD4+ count below 200 cells/μL [9]. According to a meta-analysis of COVID-19 outcomes, lymphopenia, thrombocytopenia, and elevated levels of D-dimer, C-reactive protein, procalcitonin, creatine kinase, aspartate aminotransferase, alanine aminotransferase, creatinine, and lactate dehydrogenase were significantly associated with the need for mechanical ventilation and mortality [10]. In the present case series, all patients exhibited at least 1 of these above-mentioned risk factors and therefore had a higher risk of developing severe COVID-19. Only 1 of the patients, who had undergone kidney transplantation, developed pneumonia and was treated with remdesivir. However, the symptoms did not worsen in the remaining 9 patients (90%). None of the patients developed a severe condition, suggesting that sotrovimab was effective in preventing progress to this stage even in patients with multiple risk factors.

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Table 1. Baseline demographic and disease characteristics of patients.

Case	Age, Sex	Underlying medical condition	BMI (kg/m²)	No. of risk factors*	Vaccination (type)	Symptoms	CT findings in lung	Days from onset to sotrovimab administration	Days from onset to symptom improvement	Adverse events
1	60s, male	Normal	25.9	1	Twice (mRNA)	Sore throat	No pneumonia	2	3	None
2	30s, male	Lung cancer	21	1	Twice (mRNA)	Fever	No pneumonia	5	11	None
3	30s, male	Cardiomyopathy (post LVAD implantation)	22.8	1	twice (mRNA)	Fever, cough, sore throat	No pneumonia	5	5	None
4	30s, male	Cardiomyopathy (post LVAD implantation) hyperlipidemia	21	2	Twice (mRNA)	Fever, cough	No pneumonia	5	6	None
5	40s, male	Chronic kidney disease (on hemodialysis) diabetes, cytopenia	29.1	2	None	Fever, sore throat	No pneumonia	4	7	None
6	40s, male	IgA nephropathy (post kidney transplantation)	23.4	3	Twice (mRNA)	Fever, sore throat	No pneumonia	2	15	Skin rash
7	50s, female	Lung cancer	24.4	2	Twice (mRNA)	Fever, sore throat	No pneumonia	2	6	None
8	30s, male	Acquired immunodeficiency syndrome, nontuberculous mycobacteriosis	20.5	1	Twice (mRNA)	Fever	No pneumonia	2	2	None
9	80s, female	Autoimmune hemolytic anemia, asthma, sleep apnea syndrome	33.7	4	Twice (mRNA)	Fever, cough	No pneumonia	3	5	None
10	40s, male	Cardiomyopathy (post heart transplantation) diabetes, hyperlipidemia, chronic kidney disease	30	6	None	Fever, cough fatigue, nausea	No pneumonia	2	3	None

* Denotes risk factors: Age ≥55 yr; diabetes for which medication was warranted; obesity (BMI >30); chronic kidney disease; congestive heart failure: NYHA class II, III, or IV; chronic obstructive pulmonary disease; and moderate-to-severe asthma. BMI – body mass index, LVAD – left-ventricular-assist-device.

In this case series, there were no moderate-to-severe adverse events. Only 1 patient (case 6) developed skin rash that may have been caused by the concomitant use of acetaminophen or resulted from viral infection. Based on these results, it can be concluded that sotrovimab could be safely administered to immunosuppressed patients or those with underlying diseases such as heart failure or chronic kidney disease.

This case series includes a relatively small number of cases. In addition, the omicron variant of SARS-CoV-2 has been reported to cause a less severe disease compared with other variants [11], which may be the reason why there were no severe cases in our patient cohort. Furthermore, previous vaccination may have contributed to prevent disease progression. Studies including additional cases from clinical practice are needed to confirm the

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Table 2. Results of blood examinations on admission.

Case	No. of risk factors in blood examination	Lymphocytes (/μL)	Platelet (×10³/μL)	D-dimer (μg/mL)	CRP (mg/dL)	PCT (ng/mL)	AST (U/L)
1	2	1358	199	0.2	0.42	0.08	29
2	1	2448	142	0.4	0.05	0.03	40
3	4	637	157	0.3	0.75	0.08	48
4	2	558	233	0.6	0.73	0.06	16
5	7	464	140	<0.1	1.64	2.78	10
6	4	512	192	0.8	0.36	0.19	26
7	4	594	147	0.9	0.28	<0.02	21
8	3	840	242	<0.1	0.82	0.02	59
9	3	1550	265	0.4	2.84	0.23	33
10	2	905	151	0.4	0.66	0.07	27

Case	No. of risk factors in blood examination	ALT (U/L)	Creatinine (mg/dL)	LD (U/L)	Ferritin (μg/L)	IL-6 (pg/mL)	KL-6 (U/mL)
1	2	47	0.9	216	199	3.6	192
2	1	29	0.88	180	172	4.8	205
3	4	32	1.13	665	69	5.0	94
4	2	11	0.97	201	67	7.9	217
5	7	7	8.99	227	190	12.9	566
6	4	15	2.19	503	34	11.7	181
7	4	14	0.86	251	56	10.4	186
8	3	70	0.88	162	380	3.1	195
9	3	13	0.84	417	468	3.5	481
10	2	26	1.28	179	27.1	3.3	218

ALT – alanine aminotransferase; AST – aspartate aminotransferase; CRP – C-reactive protein; IL-6 – interleukin-6; KL-6 – Krebs von den Lungen-6; LD – lactate dehydrogenase; PCT – procalcitonin. Cut-off values: Lymphocytes <1500/μL; Platelets <150×10³/μL; D-dimer >0.5 μg/mL; CRP >1.0 mg/dL; PCT >0.5 ng/mL; AST >40 U/L; ALT >40 U/L; Creatinine >1.07 mg/dL; LD >222 U/L; Ferritin >500 μg/L [12]; IL-6 >55pg/mL [13]; KL-6 >406.5 U/mL [14].

efficacy of sotrovimab in preventing disease progression into a severe condition in patients presenting with various comorbidities.

Conclusions

Phase 3 trials have provided limited data on the efficacy and safety of sotrovimab in patients with severe comorbidities such as cancer, cardiac disease, renal disease, and immunocompromised conditions. We presented the clinical outcomes of sotrovimab treatment in 10 high-risk patients with mild COVID-19 at our hospital between December 2021 and February 2022. The clinical outcomes suggest that sotrovimab might be safe and effective in preventing disease progression in COVID-19 patients with several different comorbidities.

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