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CASE REPORT

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Common variable immunodeficiency with granulomatous-lymphocytic interstitial lung disease treated with monoclonal antibodies against COVID-19: A case report

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Abstract

Common variable immunodeficiency (CVID) is the most prevalent primary immunodeficiency. We present a 22-year-old Caucasian woman with CVID and granulomatous lymphocytic interstitial lung disease who contracted COVID-19 and was successfully treated with sotrovimab and molnupiravir. This treatment may have contributed to the relatively mild disease course of COVID-19 in our patient.

KEYWORDS

COVID-19, CVID, GLILD, molnupiravir, primary immunodeficiency, sotrovimab

1 | INTRODUCTION

Patients with common variable immunodeficiency (CVID) present with recurrent infectious, inflammatory, and malignant diseases due to impaired immunoglobulin production and subsequent hypogammaglobulinemia and immune dysregulation. CVID is a heterogeneous group of disorders and, overall, the most prevalent primary immunodeficiency. The most important treatment consists of long-term replacement of unspecific immunoglobulins.[1] Prophylactic antibiotics are considered under certain circumstances such as chronic lung disease, and passive immunizations are highly recommended. Treatment with different monoclonal antibodies, like vedolizumab or ustekinumab, and allogeneic stem cell transplant (ASCT) are still in evaluation.[2]

2 | CASE REPORT

We present the case of a now 22-year-old Caucasian woman who was diagnosed with CVID at the age of 11 years and, by then, had suffered from immune thrombocytopenia, herpes zoster, and osteomyelitis at the ages of 5, 8, and 9 years, respectively. With diagnosis, the regular application of initially intravenous and, later, subcutaneous immunoglobulins was started. At the age of 17 years, the patient fulfilled the diagnostic criteria for granulomatous-lymphocytic interstitial lung disease (GLILD) and was treated with corticosteroids and two doses of rituximab.[3] A subsequent CT thorax showed regressive results. Other aspects of her disease course include multiple pneumonias, splenomegaly, and pancytopenia most likely due to autoimmunity in the context of CVID.

TABLE 1 Courses of laboratory parameters before, during, and after COVID-19 diagnosis

Days	CRP (mg/dl)	Leukocytes (G/L)	Hemoglobin (g/L)	Thrombocytes (G/L)	SARS-CoV-2 CT	IgG (mg/dl)	IgG1 (mg/d)	IgG2 (mg/d)	IgG3 (mg/dl)	IgG4 (mg/d)	IgA (mg/dl)	IgM (mg/dl)	IgE (kU/L)
22.11.2021	0.44	1.4	119	64		1750	1260	634	25.8	21.7	<7	<4	<4.3
COVID-19 infection													
08.01.2022	2.03	2.1	125	59	+								
10.01.2022	2.01	1.0	120	56	21	1620						6 (12.01)	
31.01.2022	0.33	1.5	126	74		1500	1020	533	20.7	19.1	<7	10	<4.6
Influenza infection													
25.02.2022	5.72	1.3	117	47	34								
28.02.2022	1.03	0.8	108	51	39.3								

Abbreviation: CT, cycle threshold.

Despite the broad availability of the vaccine and existing recommendations for mRNA vaccines for patients with CVID at the end of 2021,[4] this patient decided against an appropriate vaccination against SARS-CoV-2. On January 7, 2022, the patient developed severe cough, sore throat, and chest pain without fever. A PCR test for SARS-CoV-2 was positive on January 10th. Subsequent sequencing revealed an omicron mutant. Symptomatic COVID-19 was diagnosed. The patient was immediately admitted to the COVID-19 ward, as, back at the time, she was considered at high risk to experience a severe or even fatal disease course.[5] SARS-CoV-2 thereby adds to other viral agents being potentially life-threatening in patients with primary or iatrogenic immunodeficiency. Adenoviral infection is another sometimes underestimated example.[6]

At presentation in the clinic, the patient took oral methylprednisolone 4 mg once daily and subcutaneous immunoglobulins 20 g once weekly. On auscultation, bilateral bronchitis rales were present. Blood examinations showed the following results: C-reactive protein 2.03 mg/dl (cut-off 0.5 mg/dl), leukocytes 2.1 G/L (range 4–10 G/L), hemoglobin 125 g/L (120–157 g/L), and thrombocytes 59 G/L (150–380 G/L) (Table 1). The chest X-ray did not show any pneumonic infiltrates. Treatment included one intravenous dose of 500 mg of the just recently approved monoclonal antibody sotrovimab (Xevudy®) and one course of the antiviral drug molnupiravir (Lagevrio®) consisting of 800 mg orally twice a day over 5 days. The patient did not report any adverse events by this treatment regime. Additionally, the patient was treated with ampicillin/sulbactam intravenously over 5 days. Her general condition improved significantly on the first day after the intravenous dose of sotrovimab, and bronchitis rales resolved overnight. She was always stable regarding her vital parameters without the need of any respiratory support. After 6 days, the patient was dismissed from the hospital in good general condition, with a cycle-measured threshold (CT) of 21.

Only 6 weeks later, the patient developed fever of up to 39.8°C and severe cough, initially dry, but within 5 days associated with hemoptysis. In reduced general condition, she was again hospitalized, and laboratory work-up showed an acute influenza infection, with a declined SARS-CoV-2 CT of 39.3. A chest CT showed even reduction in the preexisting consolidated and fibrotic areas compared with an earlier CT from January 2021, stable bronchiectasis, and diffusely distributed ground-glass opacities, without pneumonic infiltrates. This time, the patient received antiviral therapy with oseltamivir (Tamiflu®) 75 mg orally twice a day. Again, the patient was at all times stable regarding her vital parameters and without any respiratory support. The patient was again dismissed in good general condition after 3 days.

3 | CONCLUSION

Literature evaluating COVID-19 in CVID patients with GLILD is growing, and two case reports showed mild disease courses even before available monoclonal antibodies.[7,8] Overall, it seems that COVID-19 in patients with CVID is not associated with an increased risk of a severe or even fatal disease course.[9–12] Our patient was regularly treated with subcutaneous immunoglobulins and, by that, clinically stable without refractory and remitting (bacterial) infections. Subcutaneous immunoglobulins, sotrovimab, molnupiravir, and oseltamivir may have contributed to the relatively mild disease courses of COVID-19 and influenza, respectively. This is one of the first publications on the safe use of sotrovimab in a patient with CVID and COVID-19.[13]

AUTHOR CONTRIBUTIONS

Christian Lechner: Conceptualization; writing – original draft; writing – review and editing. **Thomas Zöggeler:** Writing – review and editing. **Romuald Bellmann:** Supervision; writing – review and editing. **Jürgen Brunner:** Supervision; writing – review and editing. **Manuela Zlamy:** Conceptualization; supervision; validation; writing - review and editing. **Michael Schirmer:** Supervision; writing – review and editing.

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None.

CONFLICT OF INTEREST

The authors have no conflicts of interest to disclose.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

CONSENT

Written, informed consent was obtained from the patient to publish this report in accordance with the journal's patient consent policy.

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