BACKGROUND

The theory of hit and run raises a possibility of novel COVID-19-associated Parkinsonism cases, as well as worsening of symptoms in patients with pre-existing Parkinson's disease (PD). To demonstrate that COVID-19 infection may lead to long-lasting immunological and neurological changes in PD patients.

With the global coronavirus disease 2019 (COVID-19) pandemic underway, the full effect of the virus infection on affected individuals with and without underlying health conditions is still far from clear. However, there is an ongoing accumulation of scientific data about the impact of the COVID-19 on the patients with health conditions that the virus might exacerbate, such as Parkinson's disease (PD). The theory of hit and run\(^1\) raises a possibility of novel COVID-19-associated Parkinsonism cases, as well as worsening of symptoms in patients with pre-existing Parkinson's Disease (PD). Here, we present a short clinical study of a patient suffering from PD, whose neurological condition was significantly impacted by the COVID-19 infection, even upon recovery from the novel virus.

1.1 Aims of the study

To investigate whether the COVID-19 infection may lead to long-lasting immunological and neurological changes in PD patients.

METHODS AND RESULTS

A clinical case of a 39-year-old man with a 2-year history of Parkinson's disease, which had no comorbidities, was observed at our center. The onset symptom was ungainly in his right hand. The study was approved by a local ethics committee, and the study agreement was voluntarily signed by the subject at the beginning. Section III of the Unified Parkinson's Disease Rating Scale (MDS-UPDRS) of the International Society for Movement Disorders (2008) was used to assess the severity of the patients' motor symptoms. The symptoms were recorded at 26 in the off-period (after a 12- to 24-hour break in taking antiparkinsonian drugs) and at 17 in the on-period (1 hour after medications Pramipexolum/Amantadinum were...
Nonmotor symptom data according to the following scales were as follows: Hamilton Depression Rating Scale (HDRS)-7, the Pittsburgh Sleep Quality Index (PSQI)-5, the Epworth Sleepiness Scale (ESS)-7, Non-Motor Symptoms Scale (NMS)-7, and the 39-item Parkinson’s Disease Questionnaire Summary Index (PDQ-39SI)-39.8. Cognitive status was evaluated by the Montreal Cognitive Assessment (MOCA) scale.

Magnetic resonance imaging of the brain was normal.

The patient’s treatment included Pramipexolum (prolonged form) 2.25 mg daily and Amantadinum 300 mg daily with marked improvement of neurological symptoms. 300 mg Amantadinum per day is a routine dosage in our department. After the use of this drug, the patient felt a reduction of stiffness, both axially and in the limbs. It is noteworthy that even though the primary use of Amantadinum is the treatment of dyskinesia associated with parkinsonism, the drug also has marked antiviral properties, such as against type A influenza virus.2

Three weeks after the examination, the patient informed us that he was suffering from COVID-19 (positive PCR test and bilateral polysegmental pneumonia on CT scan). He did not need ventilation support and intensive care and has not followed special experimental antiviral therapy. He followed the ambulant regimen and took anticoagulant drugs. After the hospitalization, the patient has not followed any special rehabilitative program.

Two weeks later, PCR retest was negative, and the pneumonia symptoms were absent. However, the patient began to exhibit general weakness, depression, loss of appetite, multiple joint pain, and increased clumsiness and heaviness. The patient was prescribed an anti-inflammatory drug tenoxicam 20 mg daily for 10 days, which did not yield positive results.

The second examination was performed two months after the first visit. Antiparkinsonian therapy was the same throughout the treatment. In addition to previous neurological signs, cogwheeling of the right leg and intensified bradykinesia on finger tapping of the right hand were found. The overall score of the third part of the UPDRS scale amounted to 31 in the off-period and 22 in the on-period, which marks worsening of the condition. Passive and active rotation in the right hip joint was painful, a new symptom that we had not observed before in this patient.

Patients’ nonmotor symptoms were also worsening: HDRS-8, PSQI-5, ESS-8, NMS-6, and PDQ-39SI-41.3.

The cognitive status of this patient remained intact (26 scores by MOCA).

MRI of the brain after hospitalization was not performed but was scheduled for a later date.

Misregulation of CD4 and CD8 T-cell numbers was also revealed as an additional finding at post-COVID-19 period: CD4+CD25hiCD127—0.023 (normal ranges (NR) 0.05-0.15), CD62L+CD45RA—0.607 (NR 0.18-0.54), CD62L+CD45RA+—0.122 (NR 0.15-0.38), and CD62L-CD45RA+—0.052 (NR 0.08-0.31).

CONCLUSION

Our data agree with previously published information that there is substantial worsening of motor and nonmotor symptoms during mild to moderate COVID-19 infection in a cohort of patients with PD.3 We found post-COVID-19-related immunological changes three weeks after the end of an acute episode. Several previously published studies point to the only reduction of CD4 and CD8 T cells in moderate and severe COVID-19 cases, whereas our observations point toward more long-term immunological changes.4,5 We think that these changes may be the basis for the clinical worsening of the patient.6 It is the central finding of the present study.

This case also demonstrates quite a short time recovery from COVID-19 and associated pneumonia, which could indicate a possible positive effect of Amantadinum against the virus. This fact can be important when investigating drug repurposing for COVID-19 treatment.7 It is a second finding.

Although the data on the effect of COVID-19 infection on the patients with neurological disorders such as PD are still quite scarce, as the data further accumulate, there might be a need for more comprehensive guidelines for treating long-term neurological and immunological complications of COVID-19 patients with PD and other neurological disorders.

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Published with written consent of the patient.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

AUTHOR CONTRIBUTIONS

Aliaksandr V. Boika and Mikhail M. Sialitski: conceptualized the research project. Mikhail M. Sialitski and Vladimir V. Ponomarev: organized the research project. Mikhail M. Sialitski, Veranika A. Chyzhyk, and Elena G. Fomina: executed the research project. Veranika A. Chyzhyk: wrote the first draft of the manuscript. Aliaksandr V. Boika and Vladimir V. Ponomarev: reviewed and critiqued the manuscript.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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