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Received 26 August 2020

Received in revised form 4 September 2020

Accepted 7 September 2020

Available online 16 September 2020

<https://doi.org/10.1016/j.neurol.2020.09.001>

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An educational case series of Parkinson's disease during the COVID-19 pandemic



Parkinson's disease (PD) and parkinsonism are very common neurological diseases that generally affects older individuals [1]. Some studies suggest that patients with PD exhibit increased susceptibility to bacterial and viral infections and an excess of pneumonia is reported as a cause of death in patients with Parkinson's disease [2]. Therefore, PD could influence the course and the result of COVID-19; however, this association remains unknown.

We describe five parkinsonian patients who tested positive for COVID-19 from 8 March to 18 April 2020, at the Fondazione Policlinico Universitario "Agostino Gemelli", IRCCS (Table 1).

All cases were positive by the reverse-transcriptase polymerase chain reaction of nasopharyngeal swabs.

1. Case 1

An 82-year-old woman with vascular parkinsonism and epileptic syndrome treated with levodopa 200 mg and carbamazepine 1000 mg presented to the Emergency Department

with three days of severe diarrhea, vomiting, and myalgias. She was normotensive, afebrile, with room-air oxygen saturation (SpO₂) of 98%. Blood chemistry tests showed hyponatremia and hypokalemia. During hospitalization, she presented myoclonus in the limbs and trunk, which have been treated with levetiracetam and clonazepam. The dosage of levodopa was split.

She also started a course of hydroxychloroquine and lopinavir/ritonavir per institutional protocol and correction of hydro-electrolytic imbalance. Her hospitalization was uncomplicated; gastrointestinal disorders improved, and she was discharged to a rehabilitation facility after a 16-day hospitalization.

2. Case 2

A 72-year-old man with drug-induced parkinsonism. He was taking olanzapine 15 mg, escitalopram 20 mg, and trihexyphenidyl 4 mg. He was referred to the Emergency Department with altered mental status and lethargy noted a few hours prior and six days of dry cough and malaise. He was normotensive, febrile (38 °C), with room-air SpO₂ at 80%, which corrected to 96% on nasal cannula (4 L/min). His chest radiograph revealed multifocal bilateral infiltrates. The serum glucose was 182 mg/dL. He received hydroxychloroquine and tocilizumab (a monoclonal antibody against the IL-6 receptor) per institutional protocol. Olanzapine was reduced and, trihexyphenidyl was suspended. His confusion gradually resolved, oxygen requirements improved, and was discharged to home after an 11-day hospitalization.

3. Case 3

A 66-year-old man with a 10-year history of PD presented to the Emergency Department with three days of dry cough and dyspnea. He was hypertensive (181/78 mmHg), febrile (38 °C), with room-air SpO₂ at 96%. The chest radiograph showed bibasilar infiltrates. He was hospitalized and started a course of hydroxychloroquine and lopinavir/ritonavir per institutional protocol. He was also started on broad-spectrum antibiotics for presumed superimposed pneumonia. Because there are drug interactions between levodopa and antiretrovirals, the dosage of levodopa was halved. After two days, he developed acute generalized dystonia; antiretrovirals were suspended and melevodopa through a nasogastric tube was administered at the prior dosage. He gradually improved and was discharged to a rehabilitation facility after a 21-day hospitalization.

4. Case 4

A 95-year-old woman, nursing home resident with PD complicated by severe cognitive impairment presented to the Emergency Department with lethargy noticed one day before the presentation. She was hypotensive (80/60 mmHg), afebrile, with room-air SpO₂ at 92%. On examination, she was

Table 1 – Patient characteristics and treatment response.

Patient No.	Age, y/Sex	Other diagnoses than COVID-19	Treatment	Adverse effects
Case 1	82/F	Vascular parkinsonism and epileptic syndrome (partial epilepsy)	Levetiracetam 1000 mg and clonazepam in small doses Split of dosage of levodopa (same dosage in four administrations instead of two)	None
Case 2	72/M	Anxiety, depression, alcohol dependence, attempted suicide, and self-injurious behaviors Drug-induced parkinsonism in the last years	Hydroxychloroquine and lopinavir/ritonavir Hydroxychloroquine and tocilizumab	None
Case 3	66/M	Parkinson's disease Superimposed pneumonia	Reduction of olanzapine Suspension of trihexyphenidyl Hydroxychloroquine and lopinavir/ritonavir Broad-spectrum antibiotics Halving the dosage of levodopa Melevodopa through a nasogastric tube	None
Case 4	95/F	Parkinson's disease complicated by severe cognitive impairment Sacral pressure ulcer Atrial fibrillation Chronic renal failure Klebsiella pneumonia urinary infection	Broad-spectrum antibiotics Comfort care	None
Case 5	56/M	Juvenile parkinsonism Diabetes mellitus hypertension	Followed-up one month later	None

using accessory respiratory muscles. The chest radiograph showed left mid-lower lobe infiltrates. She was admitted, started on broad-spectrum antibiotics, and additionally treated with support oxygen therapy. Later she developed a *Klebsiella pneumonia* urinary infection in the hospital ward. Finally, her family opted for comfort care, and she expired on hospital day 9.

5. Case 5

A 56-year-old man with juvenile parkinsonism, presented to the Emergency Department with three days of dry cough, subjective fever, and myalgias. He was normotensive, afebrile, with room-air oxygen saturation (SpO₂) at 98%. He did not require hospital admission, was followed-up one month later and his symptoms had resolved.

6. Discussion

COVID-19 is a heterogeneous disease that varies from asymptomatic in some patients to fatal in others. Advanced age, male gender, and comorbidity have been identified as risk factors for adverse prognosis [3,4].

We wanted to report studying the effects that parkinsonian syndrome could have on patients with COVID-19.

Our patients were older adults aged 56 to 95 years. All had underlying conditions, identified as high-risk comorbidities. Still, none of the patients needed mechanical ventilation or intensive care management, and with the exception of one fatality, they all eventually recovered (Table 1). The only fatality was a patient with multiple risk factors, including advanced age, nursing home residence and multiple comorbidities.

This small case series raises the possibility that COVID-19 infection may not necessarily be associated with poor

outcome in patients with parkinsonism. This must be confirmed in a larger study.

Disclosure of interest

The authors declare that they have no competing interest.

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Received 20 June 2020

Received in revised form 29 July 2020

Accepted 30 July 2020

Available online 12 September 2020

<https://doi.org/10.1016/j.neurol.2020.07.007>

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Ischemic cerebrovascular diseases in patients with COVID-19



The severe acute respiratory syndrome Coronavirus 2 (SARS-CoV-2) had newly emerged and became an evolving pandemic of international concern. Its major clinical features are due to respiratory complications. Recently, some publications illustrate the neuroinvasive potential of COVID-19 [1–3].

A total of 359 patients were diagnosed with confirmed SARS-CoV-2 infection in Saint-Camille Hospital in France between 8 March and 1 May 2020. Only four patients presented acute ischemic cerebrovascular diseases (ICVD). The first patient was a 93-year old female presenting with a cardioembolic stroke. His blood cultures were negative after taking antibiotics for 48 hours. She had positive lupus anticoagulants (LA). Transthoracic echocardiography (TTE) revealed mitral endocarditis. Therefore, she was excluded from this study. Here, we describe the other three cases in whom oropharyngeal swabs were positive for SARS-CoV-2 on reverse-transcriptase-polymerase-chain-reaction (RT-PCR) assay on admission. Their lung computed tomographic (CT) imaging showed typical features of COVID-19 with different degrees of lesion extent. Their laboratory results showed increasing inflammatory parameters in the acute phase of stroke setting.

Further details are summarised in Table 1.

1. Case patient 1

A 65-year old man, with no medical history, was referred to our department for major psychomotor slowing progressing within 9 days. His body temperature was 38 °C and his oxygen saturation was 92% on room air. His blood pressure was 120/85 mmHg; it was stable during hospitalisation. He was well oriented in time and space. He had bradyphrenia but his verbal responses were appropriate. His spontaneous and organised movements in response to command were clearly executed weakly and slowly highlighting cognitive and motor components impairment. Cerebrospinal fluid (CSF) examination was normal. Electroencephalogram showed slow oscillations without epileptiform features. CT imaging of the brain was normal. Brain magnetic resonance imaging (MRI) disclosed multiple subcortical periventricular stroke with corona radiata damages (Fig. 1 A1-2, B1-2). CT imaging of the supra-aortic vessels, TTE and holter electrocardiogram (HE) were normal. He was treated with antiplatelet agents and prophylactic anticoagulation. After one month of follow-up, psychomotor impairment had gradually improved.

2. Case patient 2

A 75-year old man, with previously smoking and alcohol consumption history, presented with fever and cough. His respiratory function was gradually worsening leading to start oxygen therapy, antibiotics. He was given anticoagulation with enoxaparine at the dose of 4000 UI every 12 hours due to his disease severity. Ten days later, he presented bilateral visual loss with majoration of his biological inflammatory syndrome. Brain MRI demonstrated vertebrobasilar ischemic stroke with infarctions in the right cerebellar hemisphere and bilateral occipital lobe (Fig. 1 C1-2, D1-2). Vertebrobasilar artery was permeable. LA were positive. CT imaging of the supra-aortic vessels revealed atherosclerosis in the carotid artery bulb without significant stenosis. TTE showed left ventricular hypertrophy and HE was normal. He was treated with aspirin. His visual function had slightly recovered within three weeks.

3. Case -patient 3

An 81-year-old man, with history of hypertension, was admitted to our department for confusion. He was afebrile and had an oxygen saturation of 89% on ambient air. He had polypnea with a rate at 24 breaths per min. Neurological examination showed aphasia and apraxia. CT imaging of the brain disclosed left superficial sylvian ischemic stroke (Fig. 1E). IgG anticardiolipin antibodies (ACL) were positive at 63 GPL (N < 20 GPL). CT imaging of the supra-aortic vessels revealed atherosclerosis in the cervical carotid artery bifurcation without significant stenosis. TTE showed mitral and aortic valve calcification. HE was normal. He was treated with aspirin. Two weeks later, his mental status had gradually improved with complete recovery of his language disorders.

Ischemic stroke is considered as a rare complication of SARS-CoV-2 infection. It is noted in 0.83% in our cohort.