

## Can SARS-CoV-2 Potentiates Early Parkinson's Disease? Case Report

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### ABSTRACT

**Introduction:** Neurological disorders and SARS-CoV-2 pandemic are two conditions with a recent well-documented association. There is emerging evidences that shows SARS-CoV-2 infection can modify clinical spectrum of manifested neurological disorders. SARS-CoV-2 also plays a crucial role in the development of future diseases as long-term consequences.

**Case Description:** We report a case report of a healthy man who unfortunately sustained a stroke due to SARS-CoV-2 resulting in left sided weakness, spasticity and apraxia. As he was making some progress in his rehabilitation course it was noted that he had motor and non-motor manifestations of Parkinson's Disease (PD).

He was given carbidopa-levodopa and patient reported better control over his rigidity. His orthostatic hypotension was managed with Midodrine. His rehabilitation goals were shifted to address both post stroke and Parkinson's disease rehabilitation.

**Discussion:** It is well known that SARS-CoV-2 in patients already diagnosed with neurodegenerative diseases carries higher risk for hospitalization and death. However, little is known regarding the *visé versa*. There have been case reports on the development of Parkinson's Disease (PD) in people after contracting SARS-CoV-2. Multiple hypotheses came up explaining the possibility that will be further analyzed in this article. Rehabilitation goals changes as the complications post SARS-CoV-2 evolve.

**Conclusion:** SARS-CoV-2 can accelerate motor and non-motor symptoms of Parkinson's disease in addition to increased anxiety levels with severe complications on the quality of the life and mental health. The role of Physiatry is crucial identifying these changes and adjusting rehabilitation plans based on patient's goals of care.

**Keywords:** SARS-CoV-2; Parkinson's Disease (PD); Magnetic Resonance Imaging (MRI)

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## INTRODUCTION

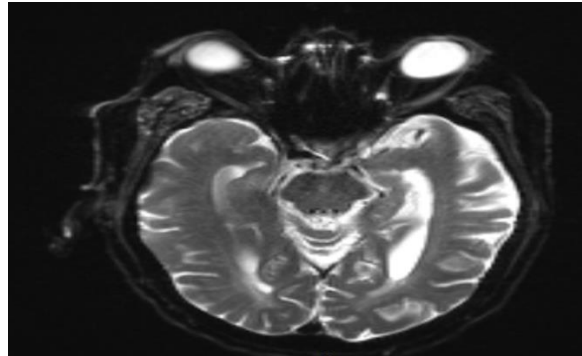
The corona virus infection originated as unexplained pneumonia in Wuhan, China, and as 2020 started, it was officially labeled “SARS-CoV-2” or “COVID-19” by the World Health Organization. It spread wildly across the nation, with millions of cases and over 600,000 deaths to date.<sup>[1]</sup> Found a diverse spectrum of neurological manifestations associated with SARS-CoV-2 ranging from post infectious mechanisms, septic-associated encephalopathies or coagulopathy<sup>[1]</sup>. In addition, this pandemic accentuated neurodegenerative disorders manifestation such as Parkinson’s Disease (PD) in patients acquiring SARS-CoV-2 infection and raised the questions of the neuro pathogenicity of corona viruses.

## CASE PRESENTATION

A healthy man presented to the emergency department with left sided weakness. His Magnetic Resonance Imaging (MRI) was remarkable for acute stroke at right middle frontal gyrus, superior aspect of right pre and postcentral gyri, and right precuneus gyrus. He was tested positive for SARS-CoV-2. Other stroke etiology related workup was negative. Post stroke deficits included left sided weakness, spasticity and apraxia. As he was making some progress in his rehabilitation course it was noted that he had motor and non-motor manifestations of (PD). He exhibited memory concerns, right hand tremor, cogwheel rigidity and postural instability. Neurological workup did not reveal other etiologies that could explain his signs and symptoms. He had profound orthostatic hypotension with position changes.

He was given a trial of carbidopa-levodopa and patient reported better control over his rigidity and hand tremors. His orthostatic hypotension was managed with Midodrine. His mobility was addressed and he was given a walker to optimize safe ambulation. His spasticity was optimized using chemo-denervation as oral anti-spasticity medications were avoided to prevent cognitive side effects. His rehabilitation goals were shifted to address both post stroke and (PD) rehabilitation.

He continued to receive physical and occupational therapies at home three times a week with improvements in his level of independence and quality of life. Further follow up in outpatient clinic showed his Parkinson’s manifestations were under control.(Figure 1)



**Figure 1:** MRI brain shows watershed infarct involving predominantly the right middle frontal gyrus, superior aspect of right pre and postcentral gyri, and right precuneus gyrus.

## DISCUSSION

There is a recent evidence that links SARS-CoV-2 with neurological disorders, ranging from limbic encephalitis to multiple sclerosis to neurodegenerative diseases such as (PD).<sup>[2]</sup> It is well known in this short time that SARS-CoV-2 in patients already diagnosed with neurodegenerative diseases carries higher risk for hospitalization and death. However, little is known about the opposite. There has been a case report on the development of (PD) in people after contracting SARS-CoV-2.<sup>[3]</sup> Multiple hypotheses came up explaining the possibility. SARS-CoV-2 results in age related loss in protein homeostasis accumulating protein aggregates which later results in accelerated aging in brain tissues affected by the virus.<sup>[4]</sup>

Another proposed mechanism is that SARS-CoV-2 attacks Angiotensin Converting Enzyme-2 ACE2 which is expressed in astrocytes in the brain stem and cerebellum. This leads to upregulation of both Neurofilament Light Chain (NfL) and Glial Fibrillary Acidic Protein (GFAP). Therefore patients with SARS-CoV-2 have meaningfully high plasma concentrations of GFAP and NfL that results in neuro-axonal degeneration.<sup>[3,4,5]</sup>

Another indirect cause of accelerated (PD) post SARS-CoV-2 is that patients with high load of SARS-CoV-2 suffer from respiratory distress that leads to systemic hypoxemia, increase dysregulation of cytokines, neuro-toxicity and protein accumulation. This by itself can potentiate the manifestations of neurodegenerative disorders like (PD).<sup>[6]</sup>

In summary, despite clear evidences of neurological consequences of corona viruses in humans, the mechanism of neuro-invasion of SARS-CoV-2 directly and indirectly remains to be established.

The role of post SARS-CoV-2 rehabilitation has been well recognized around the world. Physiatrists address the deconditioning that resulted from acquiring this deadly virus in addition to optimize the patient's quality of life.

Recognition of (PD) as a complication post SARS-CoV-2 adds to the goals of care working on safe mobility as well as managing tremor and rigidity to prevent future falls hence re-hospitalizations.

## CONCLUSION

SARS-CoV-2 is not solely confined to the lungs. The human brain is very susceptible to direct and indirect damages. Current evidence concurs that patients with premorbid neurodegenerative disorders have worse outcomes when contracting SARS-CoV-2. Emerging data supports the acceleration of neurological complications including neurodegenerative disorders such as (PD) post SARS-CoV-2. Physiatry role come into play with proper rehabilitation and working on managing the complications associated with this deadly virus.

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