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Commentary

Clinical Manifestations of Neuro-COVID Syndrome

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Clinical symptoms and signs of CNS (Central Nervous System) and PNS (Peripheral Nervous System) involvement can be seen in up to 25% of SARS-CoV-2 (Severe acute respiratory syndrome coronavirus-2) infected patients. Some researchers propose the term "Neuro-COVID syndrome" for presentations with pure CNS and PNS presentations at onset. We want to have a mini-review of neurological manifestations of coronavirus disease in this editorial.

Based on literature, there are different symptoms and signs related to SARS-CoV-2 [1-11]:

1. Dizziness which is not a specific symptom. It can be seen in most of the cases.
2. Headache with different pathophysiology according to phase of COVID-19 illness.
3. Altered mental state which can be detected in up to 9% of hospitalized COVID-19 patients, especially severe cases.
4. Meningitis with different manifestations including delirium (71%), aphasia (53%), headache (34%), seizures/status epilepticus (34%), focal neurological deficits (18%), and myoclonus (9%) with a single patient having parkinsonian syndrome (3%).
5. Encephalitis which is reported with more fulminant course.
6. Ischemic stroke due to pro-coagulant state, which may result from either blood flow stasis, particularly in critically ill patients or hypercoagulability and direct endothelial damage via ACE-2 (Angiotensin-converting enzyme 2) receptors.
7. Hemorrhagic stroke due to cerebral autoregulation dysfunction.
8. Venous sinus thrombosis with pathophysiology like stroke.
9. Seizure due to direct invasion of SARS-CoV-2 or results of hypoxia, metabolic and electrolyte imbalances.
10. Subarachnoid hemorrhage with an unknown mechanism.
11. Neuroimmunological disorders may be due to demyelination and a delayed immune response.
12. Movement disorders as a result of COVID-19-associated immune activation in the olfactory system leading to alpha-synuclein misfolding and development of Parkinsonian features.
13. Smell impairment reported in 5 - 90% COVID-19 cases, with females outnumbering males.

14. Taste impairment more commonly reported in European cases as compared to Asian.
15. Guillain-Barre syndrome with postinfectious immune-mediated pathology.
16. Myasthenia gravis which can be seen in some reports. The probable molecular mimicry between the SARS-CoV-2 proteins and acetylcholine receptor might have activated the immune response.
17. Myositis in critically ill patients.
18. Rhabdomyolysis can be seen in hospitalized cases.
19. Myopathy which may be detected in ill patients.
20. Neuropathy which is usually seen in critical phase of disease.
21. Hydrocephalus with an unknown pathophysiology.

Useful investigations for these manifestations are:

1. Neuroimaging including brain computed tomography (CT), positron emission tomography (PET) and brain magnetic resonance imaging (MRI),
2. Cerebrospinal Fluid (CSF) analysis,
3. Electroencephalography (EEG),
4. Electrophysiological studies.

The most important conclusion of this editorial is that the virus may present with an extensive range of CNS and PNS manifestations.

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