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Neurological Manifestations of COVID-19: what we know thus far

Dear Researcher,

The list of clinical manifestations of COVID-19 is regularly updated as clinicians around the world publish clinical findings. It is respiratory symptoms that threaten patient survival, however an increasing number of publications report associated neurological indications. In this series of newsletters we aim to keep you updated with the latest evidence for COVID-19 effects on the nervous system.

One of the first papers to report on the topic was a paper published in Jama Neurology in April 2020, Mao *et al*., (2020).

The retrospective case study looked at 214 COVID-19 hospitalized patients in the Huazhong area in Wuhan, China. It reported that 36.4% of the patients showed some central neurological manifestations. These included headache, dizziness, impaired consciousness, ataxia (abnormal, uncoordinated movements) cerebrovascular disease, and epilepsy. Of these, dizziness and headache were the most commonly reported symptoms.

Peripheral nerve symptoms included hypogeusia (loss of taste), hyposmia (loss of smell), neuralgia, and some muscular symptoms with pain, myalgia, and elevated creatine kinase. The authors also noted that neurological symptoms were more common in patients with severe respiratory disease.

A parallel study conducted in Strasbourg, France (Helms *et al*., 2020), also reported approximately one third of hospitalised patients displayed neurological symptoms including headache, dizziness, agitation, delirium, ataxia and corticospinal tract signs. Table 1 lists the findings from this study.

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Table 1. Characteristics of the Patients with Covid-19 and ARDS.*

Variable	All Patients (N=58)
Sedation for ARDS	
Midazolam	
No. of patients (%)	50 (86)
Days of treatment	
Median	4
Interquartile range	4–7
Propofol	
No. of patients (%)	27 (47)
Days of treatment	
Median	0†
Interquartile range	1–6
Sufentanil	
No. of patients (%)	58 (100)
Days of treatment	
Median	8
Interquartile range	4–12
Neurologic signs — no./total no. (%)	49/58 (84)
Temperature >38.5°C at time of clinical examination	8/49 (16)
Positive findings on CAM-ICU‡	26/40 (65)
Agitation	40/58 (69)
Corticospinal tract signs	39/58 (67)
Dysexecutive syndrome	14/39 (36)
Brain MRI — no./total no. (%)	
Leptomeningeal enhancement	8/13 (62)
Perfusion abnormalities	11/11 (100)
Cerebral ischemic stroke	3/13 (23)§
CSF analysis — no./total no. (%)¶	
Oligoclonal bands with the same pattern in serum	2/7 (29)‖
Elevated CSF IgG and CSF protein levels	1/7 (14)‖
Low albumin level	4/7 (57)
Negative RT-PCR for SARS-CoV-2 in CSF	7/7 (100)

* ARDS denotes acute respiratory distress syndrome, CSF cerebrospinal fluid, MRI magnetic resonance imaging, RT-PCR reverse-transcriptase polymerase chain reaction, and SARS-CoV-2 severe acute respiratory syndrome coronavirus 2.

† Some patients received propofol for less than 1 day.

‡ The Confusion Assessment Method for the ICU [intensive care unit] (CAM-ICU) is a diagnostic algorithm for determining the presence or absence of delirium on the basis of four features: acute change or a fluctuation in mental status, inattention, disorganized thinking, and altered level of consciousness.

§ One of the three ischemic strokes had the appearance of subacute infarcts on MRI and probably existed before SARS-CoV-2 infection.

¶ The seven lumbar punctures were performed in seven of the eight patients who underwent brain MRI and electroencephalography (one lumbar puncture was contraindicated because of anticoagulation).

‖ The patient with oligoclonal bands with the same pattern in serum and the patient with elevated CSF IgG and CSF protein levels are different patients.

To date, there is no clinical data on possible long-term complications of COVID-19 from these neurological manifestations. During the next few weeks we will look at what is known of neurological effects from previous Coronavirus outbreaks, the mechanisms of viral infection of the brain, and also keep you updated with new literature in this field.

Good luck with your research,

The Biosensis Team

References:

Helms, Julie, et al., Neurologic Features in Severe SARS-CoV-2 Infection. New England Journal of Medicine, 2020

Mao, Ling, et al., Neurologic Manifestations of Hospitalized Patients with Coronavirus Disease 2019 in Wuhan, China. JAMA Neurology, 2020

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