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LETTER TO THE EDITORS

Acute new-onset symptomatic seizures in the context of mild COVID-19 infection

Maria Gaughan[1] · Sean Connolly[2] · Shamindra Direkze[3] · Justin A. Kinsella[1]

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Dear Sirs,

In the midst of the COVID-19 global pandemic, two patients with no previous history of seizures presented to our institution with acute symptomatic seizures in the context of mild respiratory SARS-CoV-2 infection.

Case 1

An 87-year-old male presented to the Emergency Department (ED) at our hospital following a generalised tonic–clonic seizure, with another 30-s convulsion witnessed in ED.

During a recent admission at another hospital for treatment of cellulitis, hoarseness prompted COVID-19 testing. RT-PCR amplification of SARS-Cov-2 nucleic acid from a nasopharyngeal swab was positive. He had remained otherwise asymptomatic and tested negative for SARS-CoV-2 prior to discharge. He had a history of traumatic brain injury, 32 years previously, from which he made a full recovery.

Examination in ED revealed drowsiness and disorientation with no lateralising clinical signs.

Urgent brain CT revealed encephalomalacia involving the inferior frontal and bilateral anterior temporal lobes consistent with previous trauma. CXR was normal. Laboratory investigations are outlined in Table 1. RT-PCR amplification of SARS-Cov-2 nucleic acid from a nasopharyngeal swab was positive. CSF was not performed due to rapid clinical recovery. The patient remained clinically well with no respiratory symptoms throughout admission.

EEG was performed following discharge. This demonstrated intermittent fronto-temporal dysfunction maximal on the right side, compatible with the known imaging abnormalities.

Case 2

A 77-year-old female presented to ED following a prolonged first generalized tonic–clonic seizure. A further generalised convulsion in the ambulance was terminated with 4 mg intravenous (IV) Lorazepam after 3 min.

Collateral history revealed malaise for two days prior to presentation, but no respiratory symptoms. She had no relevant past medical history. She was high functioning at baseline, working in higher education as a course director.

Urgent noncontrast CT brain and CT angiography was normal. CXR demonstrated bibasal infiltrates. RT-PCR amplification of SARS-Cov-2 nucleic acid from a nasopharyngeal swab was positive. CSF constituents were normal (Table 1) and SARS-CoV-2 in CSF was not detected. MRI Brain was normal.

The patient had a prolonged encephalopathy with disorientation and bradyphrenia resulting in a protracted admission. EEG was performed three weeks following initial presentation and demonstrated significant bilateral cerebral dysfunction without any epileptiform abnormalities (Fig. 1). Montreal Cognitive Assessment (MOCA) performed four months post hospitalization was 24/30, suggesting persistent cognitive deficit.

✉ Maria Gaughan
Maria.gaughan@svhg.ie

[1] Department of Neurology, University College Dublin, St. Vincent's University Hospital, Elm Park, Dublin 4, Ireland

[2] Department of Clinical Neurophysiology, St. Vincent's University Hospital and University College Dublin, Dublin, Ireland

[3] Department of Gastroenterology, St. Vincent's University Hospital, Elm Park, Dublin 4, Ireland

Table 1 Initial laboratory investigations for each patient following presentation with seizures

Variable	Units	References	Case 1	Case 2
White Cell Count	10^9/L	3.5–11	11.6	11.9
Lymphocytes	10^9/L	1–4	0.6	0.9
Neutrophils	10^9/L	2–8	9.6	8.9
SARS-CoV2 RNA			Detected	Detected
Ferritin	ug/L	13–150	221	657
LDH	ng/L	240–480	450	469
Troponin	ng/L	3–14	36	37
CSF WCC	Per cmm	0–5	N/A	3
CSF Protein	g/L	0.15–0.45	N/A	0.3
CSF Glucose	mmol/L		N/A	3.7
CSF Gram Stain			N/A	Negative
CSF Viral PCR HSV/VZV/Enterovirus			N/A	Not detected
SARS CoV2 (CSF)			N/A	Not detected

Discussion

We describe two patients presenting acutely with new-onset seizures in the context of COVID-19 infection. While one patient had a history of traumatic brain injury 32 years previously, this was not accompanied by or followed by seizures and the second patient had no known risk factors for seizures. In this case, severity of COVID 19 infection—in terms of hypoxia, multi-organ failure or marked metabolic derangement, suggested as potential confounders [1], did not appear to be a causative factor. The severe and prolonged cognitive deficit in the second patient was notable given the relatively mild clinical course of her COVID-19 infection. We presume she developed a form of COVID-19–related encephalopathy with persistent EEG abnormalities noted. We note that neither patient had radiological or biochemical evidence of direct CNS COVID-19 involvement.

While initial reporting suggested that neurological complications were uncommon in COVID-19 infection, seizures as the presenting complaint are increasingly reported [2, 3]. Rarely, severe neurological presentations manifest in those with mild infection [4, 5].

The pathological mechanism underlying multisystem involvement in SARS-Co-V2 is unclear. The possibility of direct invasion of the neural parenchyma via the olfactory bulb, resulting in neuronal death without widespread inflammation has been postulated [6]. The second pathogenic theory of a proinflammatory cascade in the context of a cytokine storm seems less likely here in the context of mild COVID-19 infection. The pathophysiological mechanisms involved remain elusive, particularly given the rarity of SARS-CoV-2 detection in the CSF [7]. Lack of access to detailed investigations due to resource restrictions will limit data available in retrospective reporting.

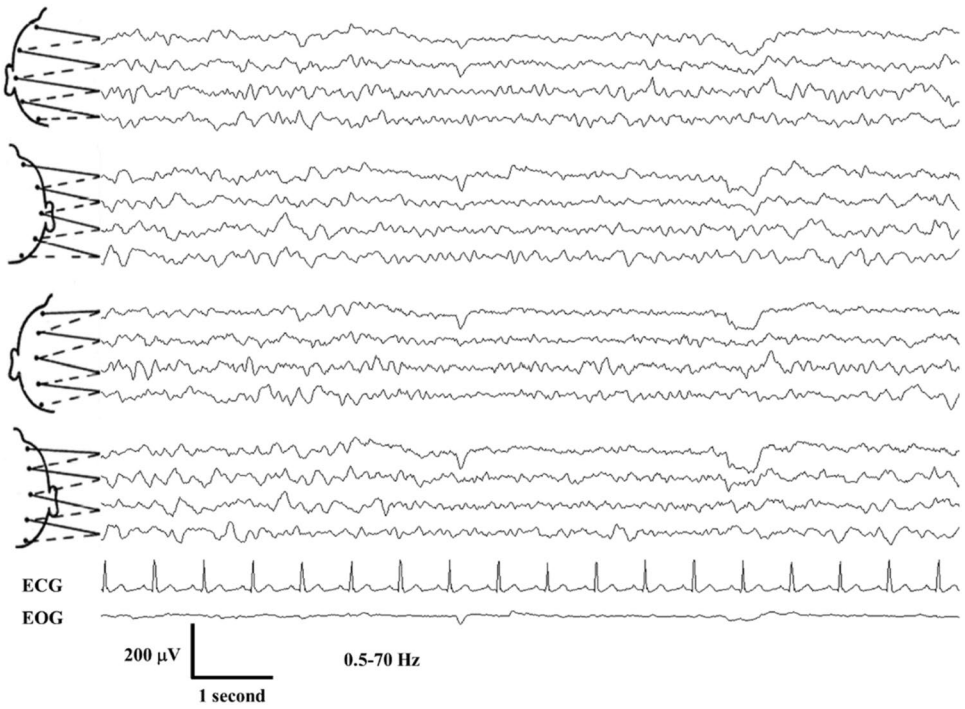

Fig. 1 Electrocephalogram (EEG) in a 77-year-old female, awake and confused (Case 2); 10–20 International system of scalp electrode placement; bipolar montage; *CG* electrocardiogram, *EOG* electrooculogram, *µV* microVolts, *Hz* Hertz, the tracing depicts recurrent excess of widespread bilateral theta and delta activity

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Data availability Clinical data is available for review.

Compliance with ethical standards

Conflicts of interests Not applicable.

Ethical approval Not applicable.

Consent to participate The patients involved have voluntarily signed consent to allow for reporting of their data.

Consent for publication The patients involved have given informed consent for publication of their data.

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