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Journal of Neuroradiology 48 (2021) 464–465

Available online at ScienceDirect www.sciencedirect.com

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A case of acute disseminate encephalomyelitis after SARS-CoV-2 related acute respiratory distress syndrome

ARTICLE INFO

Keywords:
SARS-CoV-2
Acute disseminate encephalomyelitis
Case report

Case

A 54-year-old man with no past medical history was admitted to our hospital with a 10-day history of coronavirus disease 2019 (COVID-19) infection, evolving rapidly to acute respiratory distress syndrome (ARDS). Thoracic CT-scan displayed infectious disorders with COVID-19 typical lesions damaging up to 50% of the lung parenchyma.

Reverse transcriptase-polymerase chain reaction in nasopharyngeal swab specimens was positive for SARS-CoV-2. The patient was intubated, sedated with midazolam and sufentanil, treated with empirical antibiotherapy (Cefotaxime, Spiramycine) and admitted to ICU.

ARDS evolution was favorable, allowing a progressive withdrawal of respiratory support 14 days after ICU admission. Later, a tracheostomy was necessary because of impaired consciousness.

Although the sedation was stopped after ten days, the patient did not show signs of waking.

Neurological examination revealed no voluntary motor activity or eye-tracking, and only a spontaneous eye-opening. Focal neurologic signs and osteo-tendinous reflexes were absent. Pupils were isocore and reactive to light. His Glasgow Coma scale was 5 out of 11 (vocal function is impossible through tracheostomia) and the Full Outline of UnResponsiveness (FOUR) score was 11/16.

On day 14 after ICU admission, cerebral tomography showed symmetric, diffuse, unspecific hypodensity of white matter in bilateral hemispheres. Cerebral Magnetic Resonance Imaging

(MRI) demonstrated multiple nodular FLAIR hyperintense lesions in the subcortical white matter, bilateral cortico-spinal tracts, and in the right optic nerve (Fig. 1). The lesions presented mild contrast enhancement and were predominantly found in both parietal and occipital lobes. They induced mild mass effect on adjacent structures and their presentation was consistent with pseudotumoral inflammatory demyelinating lesions observed in acute disseminated encephalitis. The medullar MRI did not show inflammatory signs. Electroencephalogram revealed moderately reduced but normo-reactive activity.

Lumbar puncture showed a normal cell count with protein levels within the reference range. Laboratory analysis revealed normal white cell count and levels of glucose and lactate dehydrogenase. Cytology, bacterial Gram stain and culture were all unremarkable. Cerebrospinal fluid screening for SARS-CoV-2, HSV, VZV, CMV, EBV, HHV6, enterovirus, HIV, and JCV was negative. Serum and CSF immunoelectrophoresis revealed oligoclonal IgG bands. The autoimmune check-up (antineuronal antibodies with an intracellular target and antineuronal antibodies with a membranous target: anti- NMDA, AMPA, GABA, Lgi1, Caspr2, glycine, DPPX, and GFAP) was negative.

Ophtalmologic exam revealed an unilateral papilledema with peri-papillary haemorrhages with otherwise normal maculae.

Taken together, the clinical and radiological work out led to the hypothesis of acute disseminated encephalomyelitis (ADEM). Corticosteroid therapy was initiated at day 15 (1 g methylprednisolone) without any clinical response.

On day 21, the patient underwent five series of plasma exchanges (PLEX). MRI at follow-up was unchanged. Third-line therapy consisted of two intravenous doses of rituximab (1 g at days 28 and 42) without significant change in the overall neurological conditions. The patient was discharged from ICU after 40 days to a long-term post-acute care hospital where his condition has remained unchanged, in a persistent vegetative state (Fig. 1).

Discussion

Neurological damage is often observed in patients with ARDS due to COVID-19.[1]

It has been previously shown that coronaviruses are able to induce direct central nervous system infections, as well as para-infectious disorders such as acute disseminated encephalomyelitis.[2,3] ADEM is a monophasic inflammatory demyelinating disorder of the CNS that occurs from a few days to weeks after a viral disease or a vaccination. It is mainly a pediatric disease, though it has also been reported in the adult population.[4]

Treatment for ADEM is based on high dose corticosteroids, intravenous immunoglobulins (IVIg), PLEX, and immunomodulatory drugs. High dose corticosteroids are the first-line therapy most often reported in the literature, with a daily bolus of methylprednisolone. Corticosteroids should be used with caution as evidence from coronavirus outbreaks suggests that they may prolong viral shedding.[5,6] In cases of insufficient response or contraindications to corticosteroids, the second-line treatment relies on IVIg or PLEX. Full recoveries in pediatric populations have been described, however the use of IVIg is correlated with a risk of thromboembolism,

Abbreviations: ADEM, Acute disseminated encephalomyelitis; ARDS, Acute respiratory distress syndrome; COVID-19, Coronavirus disease 2019; ICU, Intensive care unit; IVIg, Intravenous immunoglobulins; MRI, Magnetic Resonance Imaging; PLEX, Plasma exchanges; SARS-CoV-2, Severe acute respiratory syndrome coronavirus 2.

https://doi.org/10.1016/j.neurad.2020.11.001

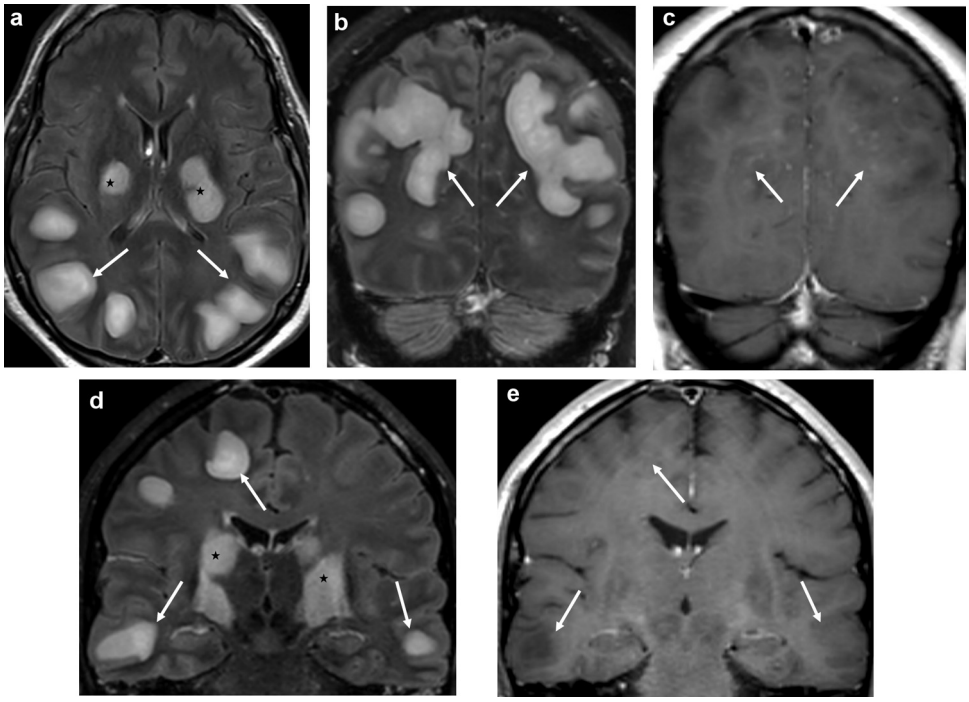

Fig. 1. Axial (a) and coronal post-contrast FLAIR (b, d) and coronal T1-weighted (c, e) MR images; (e) multiple nodular hyperintense FLAIR subcortical (arrows) and corticospinal tract (stars) lesions with mild enhancement on T1-weighted MR images (c, e).
Abbreviations: MR: magnetic resonance.

which is itself considerably increased in patients with COVID-19.[7,8] Third-line therapies are based on the administration of cyclophosphamide or rituximab. At present, we do not have definite therapeutic options and recovery times in this population. However, we should be aware that patients with cerebral damage require prolonged stays in the ICUs which are already overburdened due to the current COVID-19 pandemic.

Disclosure of potential conflicts of interest

The authors have no conflicts of interest in relation to the findings reported in this article.

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Available online 18 November 2020