Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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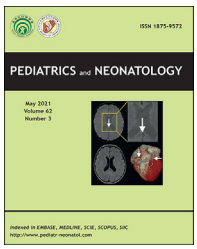

Images

Critical illness-associated brain microhemorrhages in a child with multisystem inflammatory syndrome secondary to coronavirus disease 2019

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A previously healthy 7-year-old male presented with fever, vomiting, and cutaneous rash for 5 days. The nasal swab reverse-transcription polymerase chain reaction for severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) was positive. After 4 days, the patient became hypoxic, with an oxygen saturation of 85%. The patient was intubated and admitted to the intensive care unit (ICU). A hemogram revealed leucopenia and low platelet count of 120,000 cells/mm^3; however, normal prothrombin and partial thromboplastin time were observed. The patient did not experience hypotension, hypertension, and autonomic dysfunction. The patient was extubated on day 10 after ICU admission. Due to the suspicion of multisystem inflammatory syndrome associated with coronavirus disease 2019 (COVID-19), a coronary computed tomography angiography was performed, revealing coronary arteries ectasia. Three days after extubation, a brain magnetic resonance imaging (MRI) was performed due to confusion and dizziness, which showed microhemorrhages in the splenium of the corpus callosum, as seen on susceptibility-weighted imaging (SWI) (Fig. 1).

Critical illness-associated cerebral microhemorrhages have been reported in patients with high altitude cerebral edema, acute respiratory failure, or severe asthma, usually in the corpus callosum (often the splenium), juxtacortical, and periventricular white matter.[1] Previous studies showed that critically ill patients with acute respiratory distress syndrome, who were treated with mechanical ventilation, also presented cerebral microhemorrhages.[2] Hypoxia, secondary to acute respiratory failure, can lead to hydrostatic or chemical-related blood–brain barrier disruption and consequent red blood cells extravasation unrelated to diffuse intravascular coagulation.

Patients with severe COVID-19 associated with acute respiratory distress syndrome can also present this complication. Evidence that SARS-CoV-2 can enter endothelial cells and cause endothelial damage has been reported; however, blood–brain barrier dysfunction secondary to hypoxemia is the main mechanism leading to cerebral microhemorrhages in patients with severe COVID-19,[3] including multisystem inflammatory syndrome in children and adolescents.[4] The time of occurrence of the brain microhemorrhages is

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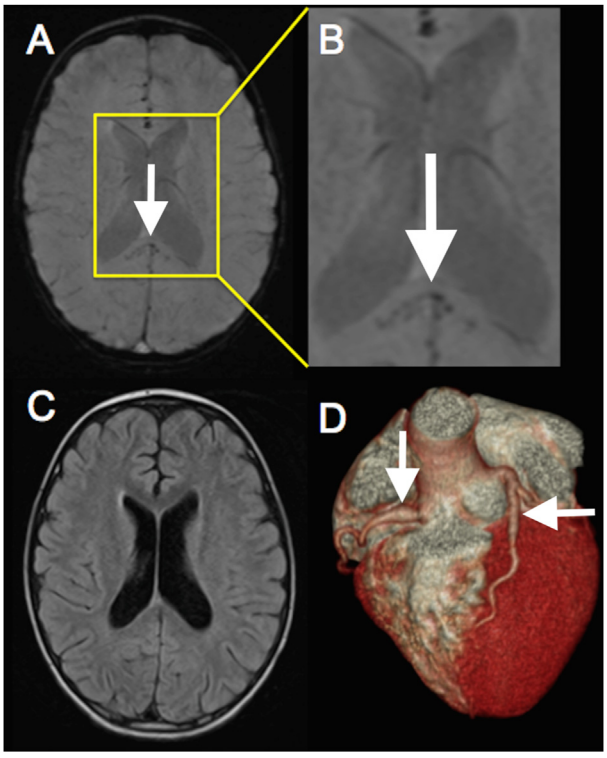

Figure 1 Critical illness-associated brain microhemorrhages in a child with multisystem inflammatory syndrome associated with coronavirus disease 2019. Brain magnetic resonance imaging showed microhemorrhages in the splenium of the corpus callosum as seen on susceptibility-weighted imaging (arrows in A and B), without abnormalities seen on other sequences. (C). A coronary computed tomography angiogram showed coronary arteries ectasia (arrows in D).

difficult to estimate; however, they could probably occur at the moment of greatest hypoxia since this is the main pathophysiological mechanism. T2*-weighted imaging and SWI are the best MRI sequences to detect these abnormalities, which are usually not seen in other sequences.

Author's contributions

DG Corrêa: image preparation and drafting of the manuscript; revision of the manuscript.

LC Hygino da Cruz Jr: interpretation of data; revision of the manuscript and oversight.

All authors have read and approved the final manuscript.

Declaration of competing interest

The authors declare that they have no competing interest.

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