

## Brain structural integrity and connectivity in Multiple Sclerosis patients with epilepsy

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### Abstract

**Background:** Seizures and epilepsy in multiple sclerosis (MS) have been related to grey matter (GM) pathology. However, the link between epilepsy occurrence and GM alterations in MS is still poorly understood. Hence, we aimed to investigate the integrity and network architecture of brain GM compartment in MS patients with concomitant epilepsy.

**Material and methods:** In 30 MS patients with epilepsy (MSE; age  $41 \pm 15$  years, 21 females), 60 MS patients without epilepsy (MS;  $41 \pm 12$  years, 35 females), and 60 healthy subjects (HS;  $40 \pm 13$  years, 27 females), 3T MRI was acquired and served to quantify the lesion loads, volumes of cortical, subcortical, and hippocampal structures and to reconstruct the GM networks. The topological organization of GM networks was assessed by applying the graph theoretical analysis.

**Results:** The MSE patients compared to MS presented significantly higher lesion loads within the medial temporal cortex and hippocampal subfields (all  $p < 0.05$ ). Similarly, lower volumes of temporal and parietal lobe cortices were attested in MSE patients compared to both MS and HS (all  $p < 0.05$ ). On hippocampal regional level, lower volumes of hippocampal tail and presubiculum were detected in both MSE and MS patients compared to HS (all  $p < 0.05$ ). Network architecture in MSE patients was characterized by a more clustered and assortative network topology compared to both MS and HS (all  $p < 0.05$ ).

**Conclusions:** High lesion load, altered integrity of mesiotemporal GM structures, and network reorganization are associated with epilepsy occurrence in MS.

**Key words:** multiple sclerosis, epilepsy, structural integrity, connectivity.

## Subarachnoid hemorrhage associated with COVID-19 infection: case series report

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### Abstract

**Background:** Subarachnoid hemorrhage is a sudden bleeding in the subarachnoid space, representing 5-10% of all strokes. Several reports of Covid-19 infection and subarachnoid hemorrhage have been published. The objective of the study was to analyze subarachnoid hemorrhage in patients with COVID-19.

**Material and methods:** Retrospective study of all electronic medical records of patients with COVID-19 treated between March 2020 and May 2021. The subarachnoid hemorrhage was identified in 7 patients out of 204.

**Results:** The study sample included 3 men (42.9%) and 4 women (57.1%) with altered mental state, convulsions, severe headache, nausea and focal signs at the presentation. In one patient hemorrhage occurred 4 days after Covid-19 detection; in 5 patients the infection and hemorrhage were confirmed at admission, and 1 patient was diagnosed with SARS – Cov-2 during hospitalization. There was a marked increase in inflammatory markers (leukocytosis, increased ESR), the presence of pulmonary lesions in 8 pts. Angio CT revealed the presence of aneurysms in 5 patients. Most underwent surgery: by clipping – 6 patients, embolization of the anterior communicating artery – 1 patient and one attempt to ligate the left internal carotid artery. Out of 7 patients – 3 died and 4 were discharged.

**Conclusions:** The subarachnoid hemorrhage can occur both at the initial stage of COVID-19 infection and later after the treatment. The association of infection in patients with subarachnoid hemorrhage leads to pulmonary involvement with inflammatory response and worsening of neurological status with poor prognosis.

**Key words:** subarachnoid hemorrhage, COVID infection-19, tomography, angiography.

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