

Cercare Perfusion Reveals Microvascular Changes in COVID-19

Case Study from Karolinska Institutet

Introduction

Neurologic complications are frequently reported in COVID-19, but our understanding of their pathophysiologic causes and neuroanatomical correlates is limited.

While several structural brain imaging findings have been reported in COVID-19, including non-spherical signal abnormalities on Susceptibility-Weighted Imaging (SWI), conventional perfusion imaging has not provided consistent insights into brain tissue status in patients with long COVID-19.

Karolinska University Hospital chose to use Cercare Perfusion and its advanced biomarkers to gain deeper insights into COVID-19 related symptoms.

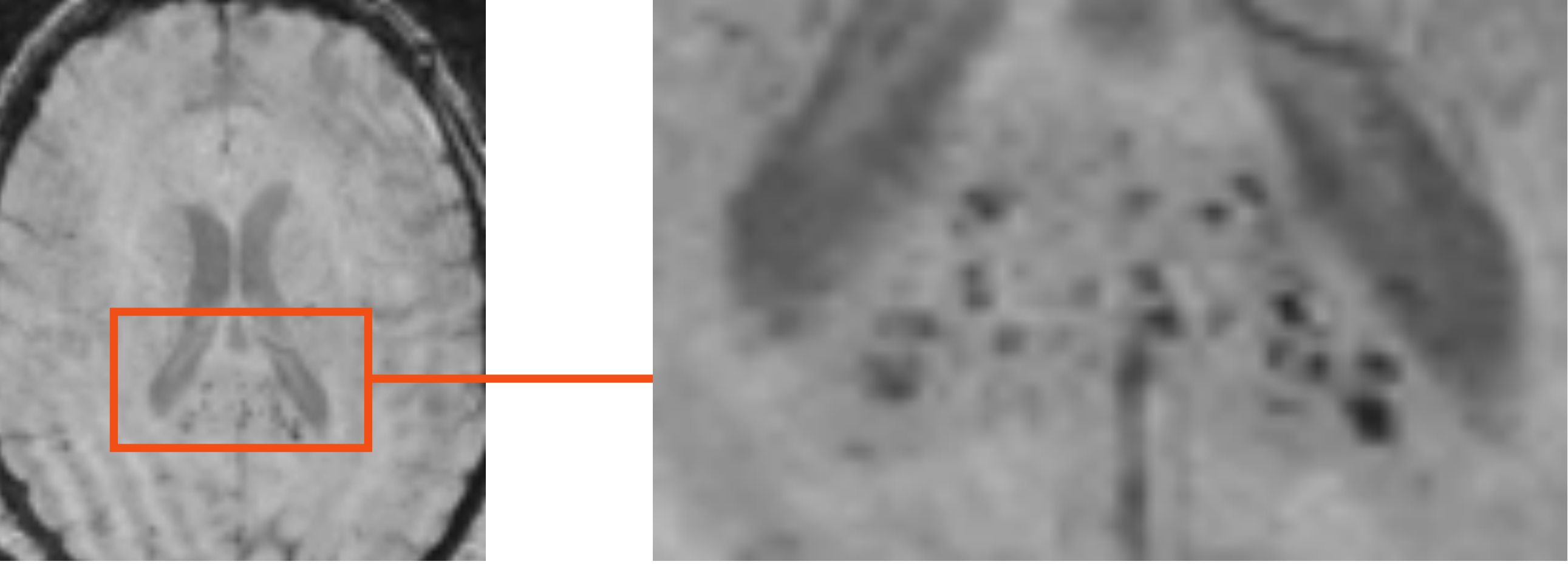


Fig 1. Microhemorrhages/microthrombi. Susceptibility-Weighted Imaging (SWI) revealed several hypointense lesions in juxtacortical and deep white matter with a predilection to the splenium of the corpus callosum.

Post-processing and analysis

Brain MRI with DSC-MRI was performed. Cercare Perfusion was used to assess the Cerebral Blood Flow (CBF), Capillary Transit-time Heterogeneity (CTH), Oxygen Extraction Fraction (OEF) and Oxygenation Coefficient of Variation (CoV).



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Case Description

A man in his 50s with a history of hypertension, hyperlipidemia and smoking presented to the emergency room with acute onset of shortness of breath, chest pain and confusion.

Diagnostic workup revealed that the patient had COVID-19. The patient was intubated and admitted to the ICU where he spent 2 weeks.

After extubation, the patient was still disorientated and suffered from decreased strength in legs and arms, most notably in his right arm.

Imaging findings

Consistent with previous findings in COVID-19, multiple SWI hypointense lesions were found in the splenium of the corpus callosum (see Figure 1) and juxtacortically. There were also a few scattered white matter abnormalities.

Conventional DSC-MRI perfusion metrics did not reveal any overt abnormalities. However, Cercare Perfusion revealed abnormal findings in advanced perfusion metrics, predominantly in the frontoparietal regions of the left hemisphere (see Figure 2), consistent with the symptomatology.

Continued research will investigate ways to better diagnose patients with such symptoms, with the hopes of finding treatments and ways to prevent long COVID-19.

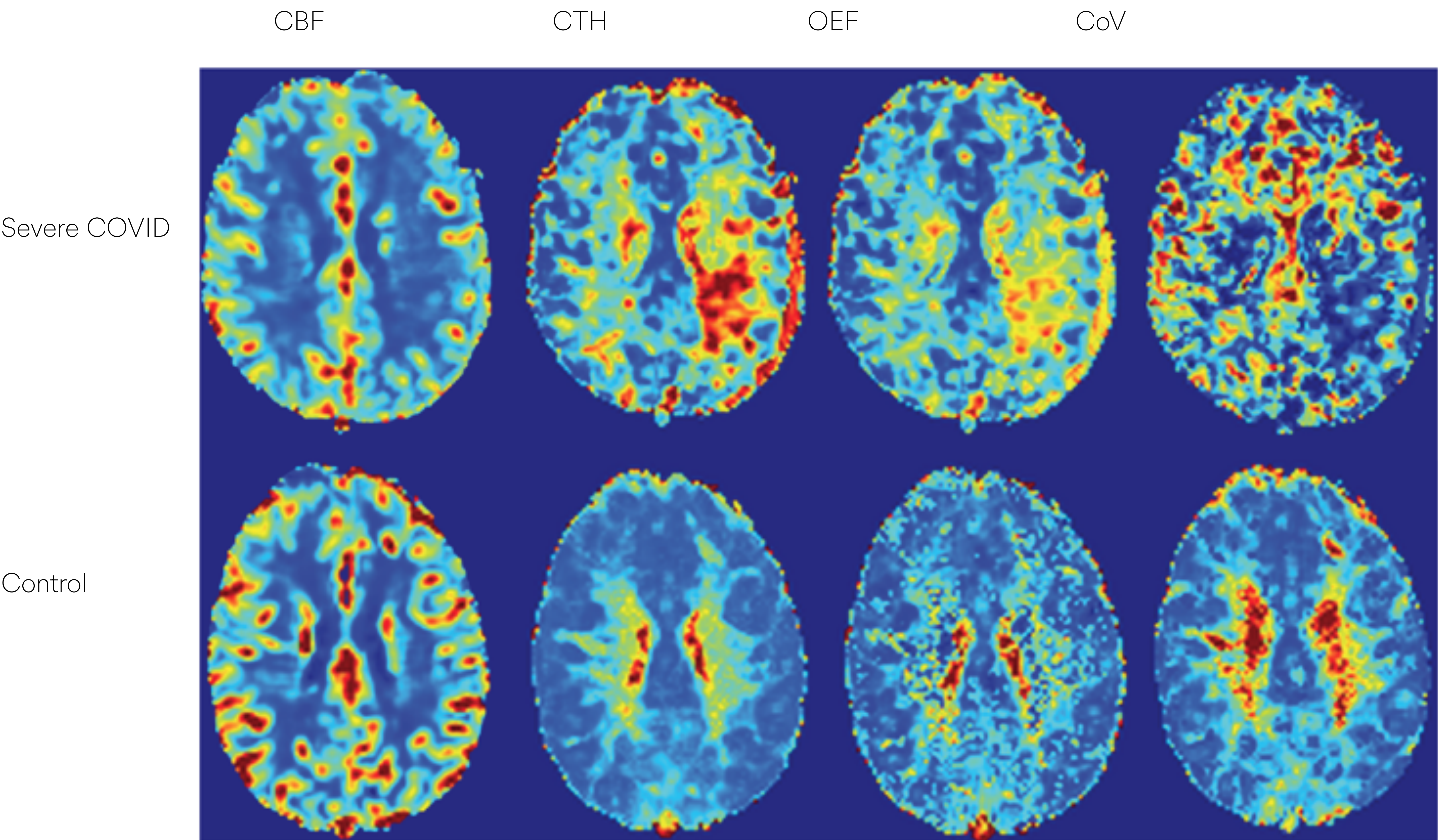


Fig 2. Perfusion maps of the patient and a healthy control. Perfusion analysis revealed unremarkable Cerebral Blood Flow (CBF) findings. Meanwhile the more advanced parameters Capillary Transit-time Heterogeneity (CTH), Oxygen Extraction Fraction (OEF) and Coefficient of Variation (CoV) revealed abnormal perfusion in the frontoparietal regions of the left hemisphere, which correlate with the right-handed weakness.