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Hemorrhagic transformation of infarction caused after transcranial magnetic stimulation (TMS)

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Introduction

Transcranial magnetic stimulation (TMS) is a noninvasive procedure that uses magnetic fields to stimulate nerve cells in the brain. Numerous clinical studies have investigated the safety and efficacy of rTMS treatment for a wide variety of conditions including depression, anxiety disorders including obsessive compulsive disorder, Parkinson's disease, stroke, tinnitus, affective disorders, schizophrenia and chronic pain. In this case, we are going to address hemorrhagic transformation caused after contralesional hemispheric repetitive transcranial magnetic stimulation (rTMS)

Case

The 60 years old male patient was injured on april 3, 2018, who was diagnosed left hemiplegia due to cerebral infarction right internal capsule and corona radiata areas. A post stroke rehabilitation was implemented for around 2 month after injury. The MMT of left upper muscle was 3 to 4 grade and he was suffering from post-stroke depression. Contra-lesional hemispheric rTMS was performed with low frequency type and no specific complication was not reported. rTMS session was consist of 2nd step. In 1st step, stimulation consisted of 40 trains of 10-Hz stimulation, each lasting for 5 seconds and then repeated every 30 second given through a figure-of-eight coil positioned over left dorsolateral prefrontal cortex (DLPFC). A total 2000 stimuli of 10 Hz were applied. In 2nd step, stimulation consisted of 20 trains of 1-Hz stimulation, each lasting for 100 seconds and then repeated every 10 second over left frontoparietal area. A total 2000 stimuli of 1 Hz were applied. After 2 days, Second trial was conducted and the patient complains for sudden headache, so we perform brain CT. Hemorrhagic transformation was identified in a right paraventricle in this test, so we implemented conservative management and discontinue anticoagulant. [Fig.1]

Conclusion

The most common adverse event related to rTMS was scalp pain or discomfort at the treatment area during active TMS treatments, which as transient and mild to moderate in severity. Other safety concerns (effects on hearing; headache, pain, induced currents in electrical circuits, histotoxicity, electromagnetic field exposure, psychiatric complications, safety in pregnancy) are debatable. When given within recommended guidelines, however, the overall safety profile of rTMS is good and it is clinically valuable treatment option for stroke patients. But the additional studies regarding the relationship between HTF and rTMS are needed, in this case, it seems clear that magnetic stimuli could be contributing factor for neuron cells and surrounding tissues with physical properties.



fig1. Hemorrhagic transformation of infarction at right internal capsule and corona radiata areas.