Does multichannel-tDCS applied over the bilateral frontoparietal cortex improve the recovery of patients with disorders of consciousness?

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In this randomized double blind sham controlled cross-over study, we aimed to assess the effects of frontoparietal transcranial direct current stimulation (tDCS) on the level of consciousness in patients with disorders of consciousness (Fig. 1).

Methods

This study was performed on patients in unresponsive wakefulness syndrome (UWS), minimally conscious state (MCS) and emergence of MCS (EMCS). 23 patients (UWS=8, MCS=14, EMCS=1; mean age: 45±12 years; 17 men; interval since insult: 4.5±7 years; 11 traumatic etiologies) underwent two tDCS sessions, either anodal or sham in a randomized order. Frontoparietal areas were stimulated using a current of 1 mA during 20 minutes (Fig. 2). Consciousness was assessed by the Coma Recovery Scale-Revised² (CRS-R) before and after each stimulation (Fig. 3).

Results

We did not observe any treatment effect in the whole population (p=0.121) but a significant treatment effect was found for the subgroup of MCS patients (p=0.019) while no significant effect was observed for the UWS patients (p=0.345; Fig. 4). We found a significant difference in the total CRS-R score before and after the real session (p=0.042) with no significant difference for the sham session (p=0.826; Fig. 5). We did not observe any tDCS related side effect (e.g. epilepsy, sign of pain, drowsiness).

Conclusion

Our results showed that frontoparietal anodal tDCS is safe and might improve the level of consciousness in half of MCS patients. This non-invasive brain stimulation technique could be useful to improve MCS patients' rehabilitation.

REFERENCES

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