

Effect of the Association of Motor Imagery Exercises and Paired Associative Stimulation In Stroke Patients (MIPAS).

Background and Aims

Paired associative stimulation (PAS) is a non-invasive brain stimulation method that modulate cortical plasticity. Motor imagery (MI) can be used as an alternative to movement execution (ME) after stroke. In this study, we want to compare the motor and electrophysiological effects of a session combining PAS and MI exercises to sessions where only one of the intervention was delivered.

Methods

MIPAS is a prospective, randomized, cross-over study. Twenty-three stroke patients with hemiparesis (mean age = 52 ± 13 years; time post-stroke = 10 ± 22 months; Upper-limb Fugl-Meyer Score (FMS) = $28 \pm 13 / 66$; Kinesthetic and Visual Imagery score (KVIQ_S) = $119 \pm 23 / 140$) were included and randomly assigned to one of the three 15' session: PAS+MI; PAS; placeboPAS+MI.

The PAS intervention consists of a combination of electrical stimulation of the hemiplegic Extensor Carpi Radialis (ECR) with cortical magnetic stimulation of the ECR cortical representation. In MI condition, the patient is instructed to imagine extension of his hemiplegic wrist and in PlaceboPAS intervention, we used a sham probe.

We compared the surface variation of the Motor Evoked Potential (MEP) of the ECR and the amplitude of Active Extension (AE) of the hemiplegic side after each session.

Results

In comparison with the other two sessions, significant facilitation associated with motor improvement was observed 15' after the end of session placeboPAS+MI ($\Delta PEM_{(C)} = +62\% \pm 96.7\%$; $\Delta EA_{(C)} = +2.9^\circ \pm 6.7^\circ$). Significant motor improvement were observed after the sessions PAS+MI and PAS ($\Delta EA_{(A)} = 4.1^\circ \pm 8.1^\circ$; $\Delta EA_{(B)} = 5.4^\circ \pm 6.1^\circ$) but not association with cortical excitability changes. The motor improvement after the session PAS was significantly higher in comparison with that observed after session placeboPAS+MI.

Conclusions

Only the session PlaceboPAS+MI seems to induce increased cortical excitability associated with motor improvement, the other sessions inducing only motor effect.