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Annals of Physical and Rehabilitation Medicine xxx (2018) xxx-xxx



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Letter to the editor

Different impact of prism adaptation rehabilitation in spatial neglect and anosognosia for hemiplegia

Dear Editor

Anosognosia for hemiplegia (AHP), the unawareness of one's own motor deficits, occurs after brain damage and is frequently associated with unilateral spatial neglect (USN). Anosognosia is frequently a transitory manifestation with spontaneous recovery, which can interfere with rehabilitation [1].

Different behavioural treatments have been proposed to improve both neglect and anosognosia. To alleviate signs of USN, one of the most recent effective techniques is prism adaptation (PA) [2], which is efficacious for most symptoms of USN. Conversely, PA does not seem to have beneficial effects on visual perceptual tasks [3] or reflexive orienting of attention [4].

For treating anosognosia, positive outcomes have been reported using caloric vestibular stimulation [5], transcranial direct current stimulation (tDCS) [6] and different cognitive procedures [7,8].

To our knowledge, only one study has investigated the efficacy of PA in USN and anosognosia in the same group of participants. Both deficits were treated with different rehabilitation techniques and evaluated before and after each rehabilitation session. The results showed a different impact of each treatment on anosognosia and USN, which resulted in treatment response bias [9]. Transient improvement of anosognosia lasting for 48 h was observed after a PA session.

We lack information on the effect of multiple treatment sessions with PA on anosognosia. Here, we describe the application of repetitive PA treatment in a patient with moderate USN and severe anosognosia.

A 64-year-old man was assessed 90 days after a righthemisphere ischemic stroke encroaching on the inferior frontal gyrus, putamen and insula. Tract-wise hodological analysis [10] revealed disconnections of superior longitudinal fasciculus, inferior fronto-occipital fasciculus and fronto-insular tracts (Fig. 1). These areas and tracts were previously found associated with AHP [11] and anosognosia for hemianesthesia (AHA) [12]. On standard clinical neurological examination, the patient presented severe hemiplegia, hemianesthesia and hemianopia. During the same evaluation, he also showed moderate AHP and moderate AHA. In everyday life, even if limited by hemiplegia, he showed some severe degree of anosognosia for his motor deficits.

The patient was tested for anosognosia and USN before PA treatment, 2 days after the end of treatment and 3 weeks later. USN assessment was performed in each session by tests of letter cancellation, star cancellation, line bisection, copy drawing and sentence reading, and the Catherine Bergego functional scale was administered (Fig. 2a–f). AHP and AHA were assessed by the Visual Analogue Test for Anosognosia for motor impairment (VATAm) [13] and the Unawareness of Motor and Somatosensory deficits after stroke questionnaire (UMAS) [14]. PA treatment was repeated over 10 sessions, performed twice a day for 5 days by use of 11.3° rightward shift prism goggles. As a sign of correct adaptation, the after-effect measured with open loop pointing over each session was significant (P < 0.0001), showing a typical process of adaptation (Fig. 2g). During the study, the patient received physical rehabilitation.

The results of repetitive PA treatment showed improvement of USN (from a global 57% of severity to 15%) with some variability across tests. The number of omissions decreased significantly in letter cancellation ($\chi^2 = 13.2$, P < 0.005) but not star cancellation ($\chi^2 = 3.95$, P > 0.05). However, no amelioration of anosognosia was observed in either of the tests administered (VATAm from 89 to 94%; UMAS 80 to 80%, Fig. 2h), with no substantial difference between AHP and AHA. The results observed after PA become substantially stable on follow-up at 3 weeks.

This evaluation, even though limited to one patient, confirms the efficacy of repeated PA treatment in USN rehabilitation. Conversely, in this case, we found no amelioration of AHP or AHA.

PA could have a short-term transient effect on anosognosia, as previously demonstrated [9], but this effect did not last longer and persisted over repeated treatment. The association between USN and anosognosia and their specific simultaneous improvement was found in single case or case series with use of vestibular

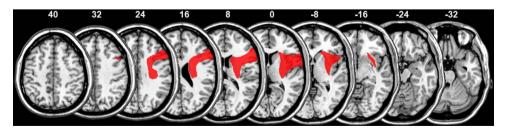


Fig. 1. Brain lesion reconstruction in a 64-year-old male with right unilateral spatial neglect (USN) and anosognosia after ischemic stroke. The lesion was identified on CT scan 90 days after the stroke and mapped into standard Montreal Neurological Institute (MNI) space. The lesion was superimposed onto a 2D axial rendering of the MNI representative brain in stereotactic space by using MRIcron software. The numbered slices correspond to Z-coordinates.

https://doi.org/10.1016/j.rehab.2017.12.007

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Please cite this article in press as: Facchin A, Beschin N. Different impact of prism adaptation rehabilitation in spatial neglect and anosognosia for hemiplegia. Ann Phys Rehabil Med (2018), https://doi.org/10.1016/j.rehab.2017.12.007

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Fig. 2. Composite results from testing for the patient; a–f: representation of results from the single neuropsychological test over sessions of evaluation for (a) letter cancellation; b: star cancellation; c: line bisection; d: Gainotti figure-copy drawing and (e) sentence reading; f: Catherine Bergego functional scale (patient report); g: after-effect of prism adaptation (open-loop pointing) for each prism adaptation (PA) session; h: representation of evolution over sessions testing unilateral spatial neglect (USN) and anosognosia for hemiplegia (AHP) measured with the Visual Analogue Test for Anosognosia for motor impairment (VATAm) and Unawareness of Motor and Somatosensory (UMAS). USN severity was the mean of the results of the 5 neuropsychological tests. In (g) data are mean (SEM). In (a–f) and (h), the y-axis represents the % severity of the deficit; lower is better. In (a) and (b), CoC is Center of Cancellation score.

stimulation [15]. However, in our case, we cannot confirm that these deficits are due to independent mechanisms [1], but the divergent improvement of USN and anosognosia suggests that different treatments should be used for their rehabilitation.

Disclosure of interest

The authors declare that they have no competing interest.

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> Received 21 September 2017 Accepted 22 December 2017 Available online xxx

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Please cite this article in press as: Facchin A, Beschin N. Different impact of prism adaptation rehabilitation in spatial neglect and anosognosia for hemiplegia. Ann Phys Rehabil Med (2018), https://doi.org/10.1016/j.rehab.2017.12.007