262 - Learning Different Postural Tasks in Patients With Poststroke Hemiparesis, Cerebellar Ataxia and Parkinson’s Disease

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Introduction: Motor cortex, cerebellum and basal ganglia are known to play different roles in learning new motor tasks [1]. However, it is not clear how the learning new postural tasks, though postural impairments have been found in patients with lesions of the above structures [2, 3]. Therefore, the aim of this study was to compare ability to perform and to learn different postural tasks using visual feedback in patients with poststroke hemiparesis, cerebellar ataxia and Parkinson’s disease.

Methods: 30 hemiparetic patients after cerebrovascular accidents, 13 patients with Parkinson’s disease (stage I-III by Hoehn & Yahr scale) and 37 patients with spinocerebellar degenerations were investigated. A control group consisted of 33 healthy subjects. The subjects stood on a force platform and were trained to change the position of the center of pressure (CP) presented as a cursor on the monitor screen in front of the patient. Subjects were instructed to align CP with the target and then move CP in the opposite direction. Two different tasks were used: task A a target position varied randomly, so the subject learned a general strategy of voluntary CP control. In task B the subject had to move the target downward from the top of the screen to a definite position at the bottom, so a precise postural coordination had to be formed. A daily session lasted 2 minutes for each task. The training consisted of 10 sessions. Two parameters were analysed: the initial level of the task performance on the first day and a learning course during 10 days.

Results: The voluntary control of the CP position was impaired in all groups of patients. In both tasks, the performance in the first session was significantly impaired as compared to the healthy subjects. In task A, there were no differences between the groups of patients in the first day. The learning course was similar as well though the final level was somewhat lower in the cerebellar patients than in the other groups. In task B, the initial deficit was greater in the groups of Parkinson’s and cerebellar patients than in hemiparetic patients. However, the learning course was better in the group of Parkinson’s patients than in hemiparetic and cerebellar patients. The learning curve in Parkinson’s disease did not significantly differ from that in healthy subjects. As a result, the final level of task B performance was approximately the same in the groups of Parkinson’s and hemiparetic patients but it was much worse in cerebellar patients.

Discussion and Conclusions: The results suggest that motor cortex, cerebellum and basal ganglia participate in voluntary control of posture and in learning different postural tasks. However, these structures play different roles in postural control. The differences mainly concern the performance and learning new postural coordination but not general strategy of voluntary CP control. Learning new postural coordination is impaired in a less degree after lesions of nigro-striatal system than after cerebellar or motor cortex lesion.

References:

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