

MoCap method in assessment of balance disorders in patients with Parkinson's disease treated with deep brain stimulation (DBS) surgery

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Introduction: Rest tremor is one of the main symptoms of Parkinson's disease (PD). According to various authors, Parkinsonian tremor (PT) is characterized by a frequency (f) of 4–6 or 3–7 Hz.

The most common scale used to assess the severity of PD is UPDRS. It has some disadvantages, like low precision and subjectivity of evaluating tremor.

The treatment of severe PD is a challenge for modern neurology. In those cases, drug therapy is not only insufficient but also may provoke dyskinesia. This is an indication for deep brain stimulation (DBS).

DBS is a well-proven and effective treatment for PD. However, evaluation of the therapeutic effect in reducing tremors after DBS is difficult to perform.

Material and methods: In our study, the analysis of PT was performed in the multimodal Laboratory of Movement with a Motion Capture Studio. The method allows one to analyze motion in three dimensions by using markers placed on the patient's body. The study included 12 patients (mean age

52 yrs) who were treated with DBS surgery between April 2008 and January 2014. The motion analysis was performed in the Motion Capture Studio of the Polish-Japanese Institute of Information Technology in Bytom. The impact of DBS on the severity of PT was studied in collaboration with the Silesian Technical University. Four sessions were recorded: S1 – recording of tremor in patients without medication or DBS stimulation, S2 – only DBS, S3 – only medication, S4 – DBS and medication. Data analysis was performed with MatLab software.

Findings: The presented method of PT measurement is repeatable. We also found a positive correlation between our method and the UPDRS scale. Thus, we have a tool that allows for quantitative assessment of the impact of different DBS treatment methods on the severity of PD symptoms. DBS reduces PT in patients with severe PD.

Key words: Parkinson's Disease; balance disorders; Motion Capture Studio