Usefulness of MoCap method in assessment of freezing of gait in patients with Parkinson's disease treated with deep brain stimulation (DBS)

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Background: The freezing of gait (FOG) is one of the least understood motor symptoms of late phase Parkinsons disease (PD). It is described as a sudden appearance of OFF state during gait. For that reason, many recent studies focus on the influence of freezing on the quality of life and risk of falls in PD patients. To assess this phenomenon, the FOG-Q questionnaire is commonly used. However, establishing a new and objective measurement method seems to be crucial in evaluating the effect of various therapies on FOG intensity. The aim of this study is to establish the usefulness of Motion Capture (MoCap) in the assessment of FOG intensity in PD Patients treated with Deep Brain Stimulation (DBS).

Materials and methods: The study included PD patients who underwent STN DBS therapy in the Silesian Parkinson's Disease Treatment Centre in Katowice between 2005 to 2011. The motion analysis was performed in the motion capture studio in the Polish-Japanese Institute of Information Technology in Bytom. The FOG intensity was independently evaluated by 4 students and young doctors based on video recordings. The results were compared with the FOG-Q score and MoCap analysis using A. Pearson cross-correlation to assess stride-to-stride variation, B. changes in the FOG-MoCap ratio (power spectrum of trajectory markers in the vertical axis for freezing frequency [3–8 Hz] / power spectrum of this signal for gait frequency [0.5–3 Hz]). The influence of DBS therapy on the FOG intensity was assessed using the data from four sessions: S1– patient without medication or DBS stimulation, S2 – DBS only, S3 – medication only, S4 – DBS and medication.

Results: The results obtained using MoCap correlate with the current gold standard (video recordings), but they do not show any effect of DBS on the freezing of gait.

Conclusion: MoCap can be used as an objective measurement method for the assessment of FOG intensity.

Key words: Parkinson's Disease, Freezing of gait, Deep Brain Stimulation

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