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Video-oculographic biomarkers for evaluating vertical ocular dysfunction in progressive supranuclear palsy

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Background: Progressive supranuclear palsy (PSP) patients show reduced amplitude and velocity of vertical saccades, but saccadic abnormalities have also been reported in Parkinson's disease (PD). We investigated amplitude and velocity of vertical saccades in PSP and PD, to establish the best video-oculographic (VOG) parameters for PSP diagnosis.

Methods: Fifty-one PSP patients, 113 PD patients and 40 controls were enrolled. The diagnosis was performed on a clinico-radiological basis (MR Parkinsonism index [MRPI] and MRPI 2.0). We used VOG to assess the diagnostic performances of saccadic amplitude, peak velocity, and their product (AxV) in upward or downward direction and in vertical gaze (upward and downward averaged) in distinguishing PSP from PD patients. The vestibulo-ocular reflex, necessary to establish the supranuclear nature of ocular dysfunction, was evaluated clinically.

Results: PSP patients showed significantly reduced amplitude and peak velocity of ocular saccades in upward and downward directions compared to PD and healthy subjects. In PD patients, upward gaze amplitude was lower than in controls. In vertical gaze, the peak velocity showed 99.1% specificity and 54.7% sensitivity for PSP classification. The AxV product showed high specificity (94.7%) and sensitivity (84.3%) and yielded higher accuracy (91.5%) than velocity and amplitude used alone in distinguishing PSP from PD.

Conclusion: Our study demonstrates that the peak velocity of vertical saccades was a very low sensitive parameter and cannot be used alone for PSP diagnosis. A new index combining amplitude and peak velocity in vertical gaze seems the most suitable video-oculographic biomarker for differentiating PSP from PD and controls.