PROGRESSION OF STATIC BALANCE IMPAIRMENTS IN HEREDITARY SPASTIC PARAPLEGIAS

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Abstract

Background: Hereditary spastic paraplegias (HSP) are a group of monogenic neurodegenerative diseases characterized by length-dependent degeneration of the corticospinal tract. Motor and proprioceptive system involvement in these diseases lead to abnormal postural control. **Aim:** To assess the progression of impairments in static balance in HSP. **Methods:** We performed a cohort study in which 13/18 subjects with HSP (6 SPG4, 4 SPG5, 1 SPG7, 2 SPG3A) assessed at baseline completed 18-month follow-up. Static balance was evaluated on a force platform by the velocities and amplitudes of displacement of the center of pressure (COP) under open and closed eyes conditions. Disease severity was assessed by the Spastic Paraplegia Rating Scale

(SPRS). **Results:** The velocity and amplitude of COP displacement in the mediolateral direction with eyes open and closed were significantly lower after 18 months of follow-up ($p<0.01$, for the four parameters). There was a reduction in the difference between COP displacement velocities and amplitudes in mediolateral and anteroposterior direction with both eyes open and closed after 18 months ($p<0.05$ for all comparisons). No correlations were identified between the progression of balance parameters and SPRS progression. **Conclusion:** The assessment of static balance by the force platform was sensitive to change over time, and the results may indicate either an improvement in balance due to factors such as rehabilitation measures and antispastic treatment or worsening of compensatory mechanisms that should generate movement to maintain balance. Larger studies should target the potential of static balance analysis as an outcome measure for clinical trials in HSP.

Keywords: Hereditary spastic paraparesis, postural instability, static balance, proprioception, force platform