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Title
High-Intensity Gait Training with Virtual Reality for Cerebellar and Pontine Stroke Recovery: A Case Series

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Background and Purpose
Early high-intensity gait training (HIGT) and virtual reality (VR) interventions have demonstrated benefits in chronic stroke rehabilitation, yet their application in acute posterior circulation strokes remains underexplored. The purpose of this case series is to investigate the feasibility and effectiveness of HIGT combined with VR to improve postural stability, gait speed, and ambulation endurance in individuals recovering from acute cerebellar and pontine stroke within an inpatient rehabilitation facility (IRF).

Case Description
This case series involved two patients with acute posterior circulation strokes. Patient A, a 72-year-old female, sustained a cerebellar stroke. Patient B, a 68-year-old male, sustained cerebellar and pontine strokes. Each patient participated in four 40-minute sessions of HIGT with VR using the Motek C-Mill VR+ treadmill system. Sessions included warm-up and VR-integrated gait training, targeting a Borg Rate of Perceived Exertion (RPE) between 14 and 17. Heart rate was monitored using a Polar Beat device. Outcome measures assessed at baseline and discharge were the Berg Balance Scale (BBS), 10-Meter Walk Test (10MWT), and 6-Minute Walk Test (6MWT).

Outcomes
Both patients had participated in four of five sessions, limited due to medical complications. Patient A improved from 34 to 38 on the BBS, from 0.50 to 0.72 m/s in gait speed on the 10MWT, and from 120 to 190 meters on the 6MWT, exceeding minimal clinically important difference (MCID) thresholds for the latter two. Her ambulation notably progressed from minimal assistance to intermittent supervision. Patient B improved from 34 to 52 on the BBS, from 0.65 to 0.96 m/s on 10MWT, and from 137 meters to 274 meters on 6MWT, exceeding MCID with all outcomes. He progressed from walking with contact guard assistance to walking independently. Average RPE for both patients was 14.4, confirming high-intensity training without adverse events. Both patients were safely discharged home following their IRF stay.

Discussion

These findings align with the APTA Research Agenda by conducting clinical research related to optimizing intervention protocols and outcomes for stroke rehabilitation. This case series demonstrates that HIGT combined with VR is feasible, safe, and effective for individuals in the acute phase of cerebellar and/or pontine stroke recovery within the IRF setting, addressing a critical gap in acute stroke rehabilitation clinical practice. Implementation considerations include medical stability and equipment access. Future studies should investigate the long-term impact of HIGT with VR, outcomes in larger cohorts, and the influence of length of stay on recovery to further bolster these findings. In conclusion, early HIGT with VR can improve postural stability, gait speed, and ambulation endurance, which can facilitate neuroplasticity and motor learning in acute stroke rehabilitation.