

Abstract citation ID: aakag023.1585

ABSTRACT NUMBER: ESOC2026A1514

***ADAPTIVE CONTROL ANKLE ROBOTICS INTEGRATED WITH
PHYSIOTHERAPY FOR SEVERE HEMIPARESIS IN SUBACUTE
STROKE: A CASE REPORT***

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Background and aims: Adaptive control ankle robotics is a promising but underexplored strategy for stroke rehabilitation. AMBLE is a wireless impedance-controlled ankle exoskeleton with foot switches that adapt dorsiflexion across gait sub-events. We

describe integrated ankle robotics and physiotherapy during sub-acute stroke recovery.

Methods: A 46-year-old man with subacute ischemic stroke, right hemiparesis, and foot drop underwent AMBLE training after reaching dependent ambulation (FAC 1) at 15 weeks post-stroke. He completed thirty 45-minute AMBLE-assisted sessions over 6 weeks, plus matched conventional therapy. Assessments at baseline (T0), post-training (T1), and 12-week follow-up (T2) included FAC, Fugl-Meyer Lower Extremity (FM), 10MWT, 6MWT, Berg Balance Scale (BBS), Dynamic Gait Index (DGI), and gait biomechanics.

Results: Robotics training data shows steps/session increased 3X, cadence 2X, and paretic heel first foot strikes from <4% to 40% over 6 weeks training. Improvements in mobility outcomes between T0 and T1 were maintained at T2: FM+11(12->23->24), 10MWT+0.32 m/s(0.24->0.45->0.56 m/s), 6MWT+109 m(71->115 m->180), BBS +12(37->46->49), and DGI +7(0->9->7). Gait analysis showed improved FAC (1->4->4), velocity (0.12->0.25->0.25 m/s), paretic step length (-0.07->0.14->0.14 m), % stance time (72->63->59%), and dorsiflexion angle (-8.8->0.58->0.82°) during unassisted over-ground walking.

Conclusions: Adaptive ankle robotics can be integrated with therapist-guided rehabilitation in subacute stroke with severe hemiparesis. Randomized trials are warranted to compare this approach with conventional therapy.

Conflict of interest: Charlene Macko and Richard Macko receive fundings from Next Step Robotics. All other authors have nothing to disclose.