A COMPARISON OF GAIT DYNAMICS WHEN USING AN ANKLE FOOT ORTHOSIS VERSUS NO ANKLE FOOT ORTHOSIS IN PEOPLE WITH SUB-ACUTE TO CHRONIC HEMIPLEGIA SECONDARY TO STROKE

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BACKGROUND AND PURPOSE: Hemiplegia following stroke is commonly associated with gait pathology characterized by reduced speed and symmetry. Intervention often includes prescribing ankle foot orthoses (AFOs) to improve safe and efficient ambulation. Gait pathology can also be examined through nonlinear analyses of fluctuations across repeated strides, although effects of AFOs on these gait dynamics have not been reported. The purpose of this study was to examine whether complexity and fractal dynamics across repeated strides change when patients with hemiplegia wear an AFO.

SUBJECT(S): Four participants with a chronic stroke participated.

METHODS AND MATERIALS: Participants completed 6 minute walk tests with and without their AFO. The testing order was randomized. Ten minutes of recovery between testing bouts were allotted. Gait parameters were measured using an APDM Movement Monitoring inertial sensor system (APDM Inc., Portland, OR).

ANALYSES: Mean stride time measurements were compared between walking conditions. Nonlinear measurements including sample entropy and fractal exponents in participants' stride times were used to compare gait dynamics between walking conditions.

RESULTS: Participants experienced a 5% change in stride time, an 11% change in sample entropy and a 13% change in the fractal exponent across several hundred strides.

CONCLUSIONS: The magnitude of change in gait associated with wearing an AFO was greater when stride time dynamics were examined with nonlinear measures of stride to stride fluctuations than when traditional measures of mean stride times were examined. Further work is needed to better define how nonlinear analyses characterize gait pathology in hemiplegic gait and to assess the effectiveness of interventions that are intended to improve patients' ambulation abilities.

IMPLICATIONS: Nonlinear measurements of stride time dynamics may be more sensitive indicators of changes in gait associated with AFO use in patients with hemiplegia following stroke than traditionally used spatiotemporal gait parameters.