Moving towards tuning of ankle-foot orthoses: The influence of carbon and plastic AFOs for individuals with Multiple Sclerosis

Follow this and additional works at: https://ecommons.udayton.edu/stander_posters

Recommended Citation
https://ecommons.udayton.edu/stander_posters/1367

This Book is brought to you for free and open access by the Stander Symposium at eCommons. It has been accepted for inclusion in Stander Symposium Posters by an authorized administrator of eCommons. For more information, please contact frice1@udayton.edu, mschlangen1@udayton.edu.
Research Objective: To determine the immediate effects of plastic and carbon ankle foot orthoses (AFOs) on individuals with multiple sclerosis (MS) leading to follow up work investigating techniques and advantages of tuning AFOs in the MS population.

Overall Hypothesis: Wearing an AFO can help improve balance, fatigue, and gait patterns for individuals with MS. However, the use of AFOs could hinder certain dynamic movements necessary for everyday tasks. Tuning could mitigate the negative effects AFOs have by customizing the brace to the individual's needs.

Methodology

10 individuals with MS were tested under baseline, carbon, and plastic brace conditions.

- **Balance Tests**
  - Quiet Standing Posturography
  - Limits of Stability (LOS)
- **Gait Tests**
  - Instrumented Timed Up and Go (iTUG)
  - 10 Meter Walk
- **Fatigue and Clinical Tests**
  - 6 Minute Walk
  - Ankle Dorsiflexor Strength

Results and Discussion

**Static Balance:** Although not statistically significant, trends emerged showing both AFOs aided in static balancing tasks (Figures 5 and 6).

**Dynamic Balance:** No significant difference (p>0.05) between brace conditions.

- Range of motion is not restricted while wearing either AFO, despite the rigid nature of the braces (Figure 7).

Gait: Gait speed data showed varying results between each participant (Figure 8).

- Overall, no significant differences (p>0.05) between the three conditions for any test.
- Majority prefer carbon AFO (Figure 9).
- Results show importance of individual responses to AFOs and patient preference.

AFO Tuning

- All AFOs from the study were off-the-shelf with only slight adjustments per person to ensure fit and alleviate any pain from pinching.
- Some participants may have benefited from a practice called AFO tuning.
  - AFO tuning techniques include:
    - Adding wedges under the heel to increase shank-to-vertical angle (SVA) (Figure 10)
    - Adjusting the footplate stiffness
    - Tuning is believed to help optimize the effectiveness of AFOs.

Acknowledgements and References

- Dr. Kimberly Bigelow – Advisor (Engineering Wellness through Biomechanics Lab)
- Dr. Kurt Jackson – Neurological Coordinator (Department of Physical Therapy)
- Mark Horowitz – Clinical Director (Hangar Clinic)
- Allard USA – provided the AFOs used in this study
- Christina Cooper – Physical Therapist (Kettering Neurorehab and Balance Center)
- University of Dayton – Summer Undergraduate Research Experience (SURE)

References: